EarthLabs Carbon Cycle – Lab 2

Lodgepole Forest Carbon Cycle Game PASSPORT Tickets:

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1. Cut tickets into strips.

2. Place tickets in the appropriate station box/bag:

   EXAMPLE: The first ticket below would be placed into the LIVE PLANT box.

*3. INSTRUCT students to **NOT** bring the passport tickets with them to the next box. They should read the ticket, note where they go next and then put the ticket back into its box.*

LIVE PLANT:

You are in a dwarf mistletoe plant eaten by a chipmunk. [ingestion]

Go to LIVE ANIMAL CONSUMERS

LIVE PLANT:

A wildfire is burning the living tree you are in. [combustion]

Go to the ATMOSPHERE.

LIVE PLANT:

You are part of the biomass of a lodgepole pine tree parasitized by a dwarf mistletoe plant.

Stay in LIVE PLANTS and draw another ticket.

LIVE PLANT:

You are in a seed eaten by a white-breasted nuthatch bird. [ingestion]

Go to LIVE ANIMAL CONSUMERS.

LIVE PLANT:

You are in the cell of a leaf eaten by a mule deer. [ingestion]

Go to LIVE ANIMAL CONSUMERS.

LIVE PLANT:

You are part of the woody tissue of the lodgepole pine tree where you are stored for 80 years before the tree dies. [death]

Count to 80.

Go to DEAD PLANTS and ANIMALS

LIVE PLANT:

You move as part of a sugar molecule produced in a pine tree needle to the bark to become part of its woody biomass. You are stored in the bark for 25 years before being eaten by a pine bark beetle. [ingestion]

Count to 25.

Go to LIVE ANIMAL CONSUMERS.

LIVE PLANT:

During the night, the pine tree releases you into the air in a CO_2 molecule.
[respiration]

Go to the ATMOSPHERE.

LIVE PLANT:

You are in the pine tree's bark eaten by a porcupine.
[ingestion]

Go to LIVE ANIMAL CONSUMERS

LIVE PLANT:

The live tree you are in is killed by pine bark beetles. [death]

Go to DEAD PLANTS AND ANIMALS

ATMOSPHERE:

You are in a CO_2 molecule taken in from the air by a dwarf mistletoe plant on a sunny day. [photosynthesis]

Go to LIVE PLANTS

ATMOSPHERE:

You are in the greenhouse gas molecule CO_2. The length of your stay here can be quite variable. You will be in the atmosphere for 10 years before moving on to a new reservoir. Count to 10 before entering the leaf of a berry bush. [photosynthesis]

Go to LIVE PLANTS

ATMOSPHERE:

You are in the greenhouse gas molecule CO_2. The length of your stay here can be quite variable
You will be here in the atmosphere for 25 years.
Count to 25 before diffusing into a stream.
Go to SURFACE WATERS

ATMOSPHERE:

You are in the greenhouse gas molecule CO_2. The length of your stay here can be quite variable.

You will be here in the atmosphere for 100 years. Count to 100 and then get absorbed by algae and blue green bacteria living on the surface water of a pond. [photosynthesis]

GO to SURFACE WATER

ATMOSPHERE:

A lodgepole pine tree in the sunshine has removed you from the air to make a glucose sugar molecule. [photosynthesis]

Go to LIVE PLANTS

ATMOSPHERE:

You are in a CO_2 molecule that moves from the air into a lake. Once there, the CO_2 reacts with water molecules to form carbonic acid (H_2CO_3). [diffusion/dissolving]

Go to SURFACE WATER

ATMOSPHERE:

You are in a CO_2 molecule absorbed by a raindrop falling into a pond. [diffusion/dissolving]

Go to SURFACE WATER

SURFACE WATER:

On a hot summer's day, you are in a CO_2 molecule swept up into the air by a breeze passing over a lake. [diffusion]

Go to the ATMOSPHERE

SURFACE WATER:

You are in a CO_2 molecule moving into the air from a stream on a hot summer's day. [diffusion]

Go to the ATMOSPHERE

SURFACE WATER:

You are in a CO_2 molecule that has diffused into the pond. A green algae floating on the surface of the pond absorbs you to make a glucose sugar molecule.
[photosynthesis]

GO to LIVE PLANTS* (algae are sometimes referred to as "floating plants")

LIVE PLANTS:

You are in a cell of a pine tree. You get respired into the air as the tree carries out cell respiration.
[respiration]

Go to ATMOSPHERE

ANIMAL WASTE:

You are in deer poop which is consumed by a honey mushroom.
[decomposition]

Go to DECOMPOSERS AND PARASITES

ANIMAL WASTE:

You are in bear poop consumed by soil bacteria and fungi.
[decomposition]

Go to SOIL and SOIL ORGANISMS

SOIL and SOIL ORGANISMS:

You are in a CO_2 molecule released into the air by soil microbes (bacteria and fungi) as they decompose dead and decaying leaves in the soil. [soil respiration]

Go to the ATMOSPHERE.

DECOMPOSERS and PARASITES:

You are in a pinedrop plant living on a log on the forest floor. As the pinedrop consumes organic matter from the log, you are released to the air in a CO_2 molecule. [respiration]

GO to ATMOSPHERE

DECOMPOSERS and PARASITES:

You are in a honey mushroom eaten by a black bear. [ingestion]

Go to LIVE ANIMAL CONSUMERS

ANIMAL WASTE:

You are in worm poop left in the soil by worms as they consume small bits of decomposed plants. [decomposition]

Go to SOIL and SOIL ORGANISMS

LIVE ANIMAL CONSUMER:

You are in a chipmunk's biomass that is eaten by a sharp-shinned hawk. [ingestion]

Go to LIVE ANIMAL PREDATORS

LIVE ANIMAL CONSUMER:

You are in the muscle tissue of a red squirrel which is eaten by a pine marten.
[ingestion]

Go to LIVE ANIMAL PREDATORS

LIVE ANIMAL CONSUMER:

The chipmunk you are within has just died from a viral infection.

[death]

Go to DEAD PLANTS AND ANIMALS

ATMOSPHERE:

You are in the greenhouse gas molecule CO_2. The length of your stay here can be quite variable.
You will be in the atmosphere for less than a week before being absorbed by moss covering a rock. [photosynthesis]

Go to LIVE PLANTS

LIVE ANIMAL CONSUMER:

You are in urine released by a urinating mule deer. [excretion]

Go to ANIMAL WASTE

LIVE ANIMAL CONSUMER:

You are in a pine bark beetle eaten by a woodpecker. [ingestion]

Go to LIVE ANIMAL PREDATORS

LIVE ANIMAL CONSUMER:

You are in a bird dropping released as a chickadee bird flutters by. [excretion]

Go to ANIMAL WASTE

LIVE ANIMAL CONSUMER:

You are in a beetle crawling on the forest floor and is eaten by a southern red-backed vole. [ingestion]

Go to LIVE ANIMAL PREDATORS.

DECOMPOSERS and PARASITES:

You are a worm living in the intestines of a bear. As the bear poops, you are released to the soil where you are consumed by fly maggots.

Go to SOIL and SOIL ORGANISMS

LIVE ANIMAL PREDATORS:

The sharp-shinned hawk you are within has died of old age. [death]

Go to DEAD PLANTS AND ANIMALS

LIVE ANIMAL CONSUMER:

You are released as a CO_2 molecule by a growling black bear. [respiration]

Go to the ATMOPSHERE

LIVE ANIMAL PREDATOR:

You are in a pine marten which is killed in a fall from a very tall tree.
[death]

Go to DEAD PLANTS AND ANIMALS

LIVE ANIMAL PREDATOR:

You have just been pooped out in a dropping by a soaring sharp-shinned hawk.
[excretion]

Go to ANIMAL WASTE

DEAD PLANTS and ANIMALS:

FIRE! The dead tree you are in is burned in a campfire.
[combustion]

Go to the ATMOSPHERE

LIVE PLANTS and ANIMALS:

The root cells of a Lodgepole Pine tree release (exude) you inside a sugar molecule into the surrounding soil where you are absorbed by soil bacteria and fungi.

Go to the SOIL and SOIL ORGANISMS

DEAD PLANTS and ANIMALS:

You are in a dead pine needle which is decomposed by a spotted coral root plant.
[decomposition]

Go to DECOMPOSERS and PARASITES

LIVE PLANTS:

Fire! The tree you are in is chopped up and burned by humans to stay warm. [combustion]

Go to the ATMOSPHERE.

LIVE PLANTS:

You are in a live pine seed that falls to the forest floor and sprouts into a pine tree seedling that grows up into a mature lodgepole pine tree over 100 feet tall.

Stay in LIVE PLANTs for 125 years before being consumed in a wildfire.
Count to 125 and then….

GO to the ATMOSPHERE

DEAD PLANTS and ANIMALS:

You are in a piece of dead, rotten wood in the forest soil and are absorbed by soil bacteria for food.
[decomposition]

Go to DECOMPOSERS and PARASITES

DEAD PLANTS and ANIMALS:

You are in rotten wood in the forest soil and are absorbed by a honey mushroom for food.
[decomposition]

Go to DECOMPOSERS and PARASITES

LIVE PLANTS:

You are in a sugar molecule in a cell in a root of a pine tree. You are absorbed by mycorrhizal fungi growing on these roots. The fungi give nutrients to the trees in exchange for the tree's sugars released from the tree's roots. [absorption]

GO to SOIL and SOIL ORGANISMS

SOIL and SOIL ORGANISMS:

You are eaten by a southern red-backed vole grubbing in the soil for insects and worms. [ingestion]

Go to LIVE ANIMAL PREDATORS

SOIL and SOIL ORGANISMS:

You are inside a soil bacterium. As the bacterium busily decomposes rabbit poop for food and nutrients, it releases CO_2 to the atmosphere as it cell respires. [Soil Respiration]

Go to the ATMOSPHERE

SOIL and SOIL ORGANISMS:

You are in tiny bits and pieces of decomposed trees and leaves in the soil. Soil bacteria decompose these bits and release CO_2 when they cell respire.

Go to the ATMOSPHERE

SOIL and SOIL ORGANISMS:

You are in tiny bits of very decomposed organic matter (SOM) in the soil. You can stay in the soil for hundreds of years before you break down further or move on to a new reservoir.
Count to 100 and then get washed away into a nearby stream that runs through the forest.

Go to SURFACE WATERS