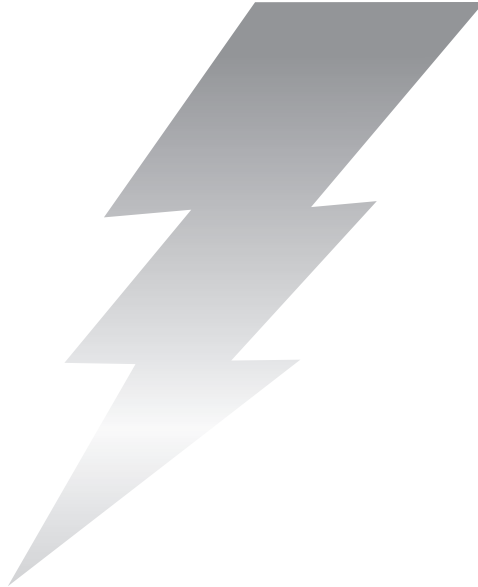


Atmosphere Station



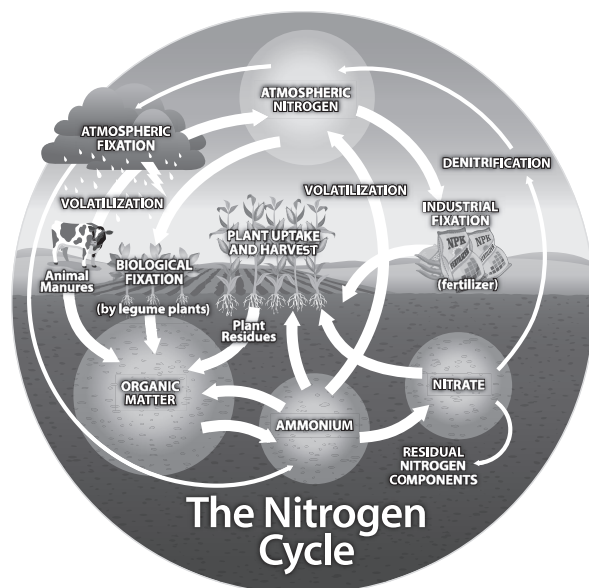
Starting Form: N_2

Dice Roll		Next Station
1 or 2	Lightning fixes atmospheric nitrogen N_2 in the atmosphere, which is carried by rain to a body of water NH_4^+ .	Body of Water
3 or 4	Agriculture fixes millions of tons of atmospheric nitrogen N_2 for use as fertilizer NH_4^+ .	Fertilizer
5 or 6	Bacteria in legumes convert nitrogen gas N_2 to a form plants can use NH_4^+ , which is added to the soil.	Soil

Instructions

- ▶ Roll the die to select your path. Fill out your chart for that path.
- ▶ Use the toothpicks and gumdrops to make a model of the starting form of nitrogen and what it changed into. Take this model with you to your next station. You will use it to model the different forms of nitrogen throughout this lab.
- ▶ When time is up, move to the next station.

Soil Station



Starting Form: NH_4^+ or NO_3^-

Dice Roll		Next Station
1 or 2	Your neighbor doesn't follow the instructions when applying lawn fertilizer. Excessive watering after application leaches nitrate NO_3^- into the groundwater.	Groundwater
3 or 4	Bacteria in the soil convert ammonium NH_4^+ into nitrate NO_3^- and it remains in the soil.	Stay at soil
5 or 6	The nitrate in the soil NO_3^- is taken up by lettuce plants.	Plant

Instructions

- Roll the die to select your path. Fill out your chart for that path.
- Use the toothpicks and gumdrops to make a model of the starting form of nitrogen and what it changed into. Take this model with you to your next station. You will use it to model the different forms of nitrogen throughout this lab.
- When time is up, move to the next station.

Fertilizer Station



Starting Form: NH_4^+ or NO_3^-

Dice Roll		Next Station
1 or 2	The right amount of fertilizer is applied to the soil and taken up by plants NH_4^+ and NO_3^- .	Plant
3 or 4	High concentrations of pet waste in urban parks and neighborhoods may lead to nutrient movement into the groundwater (NO_3^-).	Groundwater
5 or 6	The fertilizer is consumed by soil bacteria, which, under anaerobic conditions, convert the nitrate into nitrogen gas N_2 which is released into the atmosphere.	Atmosphere

Instructions

- ▶ Roll the die to select your path. Fill out your chart for that path.
- ▶ Use the toothpicks and gumdrops to make a model of the starting form of nitrogen and what it changed into. Take this model with you to your next station. You will use it to model the different forms of nitrogen throughout this lab.
- ▶ When time is up, move to the next station.

Plant Station



Starting Form: Organic N

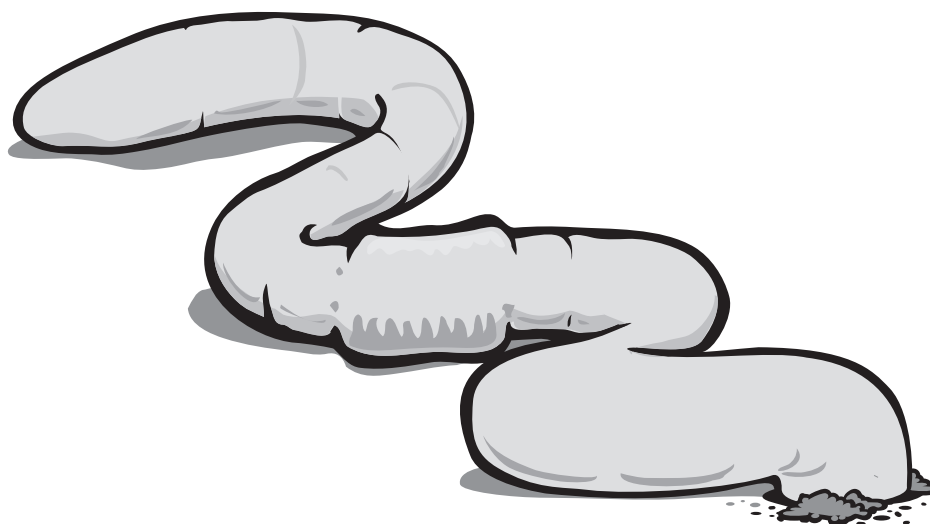
When NH_4^+ or NO_3^- is assimilated by a plant, we use the term "organic nitrogen" to describe the nitrogen compounds in the plant. These nitrogen compounds include many types of proteins, or by-products of protein digestion, such as urea and ammonium.

Dice Roll		Next Station
1 or 2	The inedible part of the plant is tilled into the ground, bacteria decompose the plant material NH_4^+ .	Soil
3 or 4	A human eats the edible part of the plant, assimilates the nitrogen, and produces waste NH_4^+ .	Waste/Decay
5 or 6	An animal eats the plant, assimilates the nitrogen, and produces waste NH_4^+ .	Waste/Decay

Instructions

- ▶ Roll the die to select your path. Fill out your chart for that path.
- ▶ Use the toothpicks and gumdrops to make a model of the starting form of nitrogen and what it changed into. Take this model with you to your next station. You will use it to model the different forms of nitrogen throughout this lab.
- ▶ When time is up, move to the next station.

Waste/Decay Station



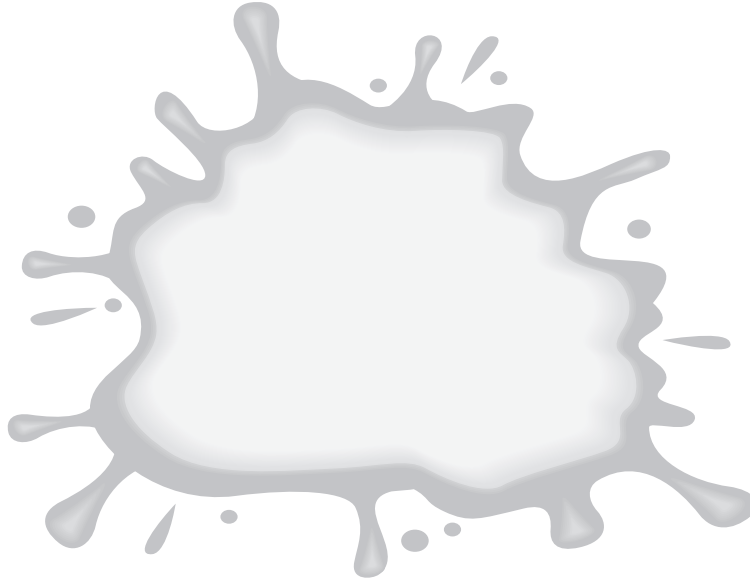
Starting Form: Organic N or NH_4^+

Dice Roll		Next Station
1 or 2	Waste and decaying materials (organic N) are composted by humans and used as fertilizer (NH_4^+)	Fertilizer
3 or 4	A malfunction at the city sewage treatment plant leads to run off into a body of water (NH_4^+).	Body of Water
5 or 6	Bacteria convert the nitrogen found in waste and decaying materials into ammonium, which remains in the soil (NH_4^+).	Soil

Instructions

- ▶ Roll the die to select your path. Fill out your chart for that path.
- ▶ Use the toothpicks and gumdrops to make a model of the starting form of nitrogen and what it changed into. Take this model with you to your next station. You will use it to model the different forms of nitrogen throughout this lab.
- ▶ When time is up, move to the next station.

Body of Water Station



Starting Form: NO_3^- or NH_4^+

Dice Roll		Next Station
1 or 2	Over time, nitrates NO_3^- from an old septic system may slowly leach into groundwater.	Groundwater
3 or 4	Nitrogen in the water is taken up by aquatic plants (NH_4^+).	Plant
5 or 6	Bacteria, in the process of denitrification under anaerobic conditions, convert nitrogen in a pond into atmospheric nitrogen N_2 which is released into the atmosphere.	Atmosphere

Instructions

- ▶ Roll the die to select your path. Fill out your chart for that path.
- ▶ Use the toothpicks and gumdrops to make a model of the starting form of nitrogen and what it changed into. Take this model with you to your next station. You will use it to model the different forms of nitrogen throughout this lab.
- ▶ When time is up, move to the next station.

Groundwater Station



Starting Form: NO_3^-

Dice Roll		Next Station
1 or 2	Underground aquifers carry the water underground until it reaches a body of water (NO_3^-)	Body of Water
3 or 4	Groundwater is pumped from underground through a well and applied to the soil (NO_3^-).	Soil
5 or 6	Bacteria, in the process of denitrification, convert nitrate NO_3^- in groundwater into atmospheric nitrogen N_2 which is released into the atmosphere.	Atmosphere

Instructions

- ▶ Roll the die to select your path. Fill out your chart for that path.
- ▶ Use the toothpicks and gumdrops to make a model of the starting form of nitrogen and what it changed into. Take this model with you to your next station. You will use it to model the different forms of nitrogen throughout this lab.
- ▶ When time is up, move to the next station.