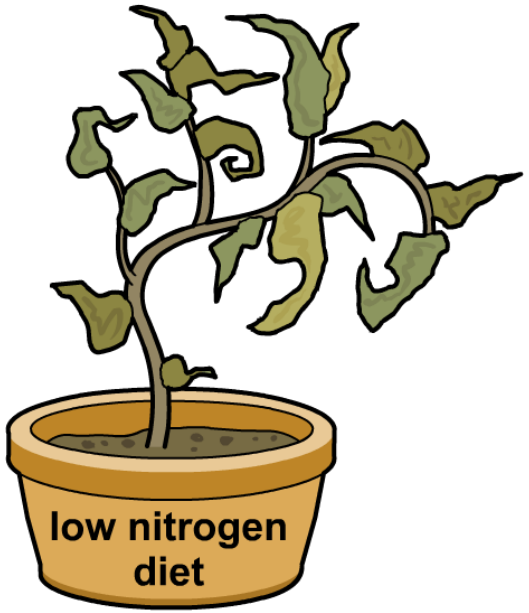
Nitrogen Cycle

Why is nitrogen so important?

Nitrogen is essential for growth because it is used by plants and animals to make proteins.

Nitrogen makes up about 78% of the atmosphere. However, nitrogen deficiency is the most common cause of poor plant growth.

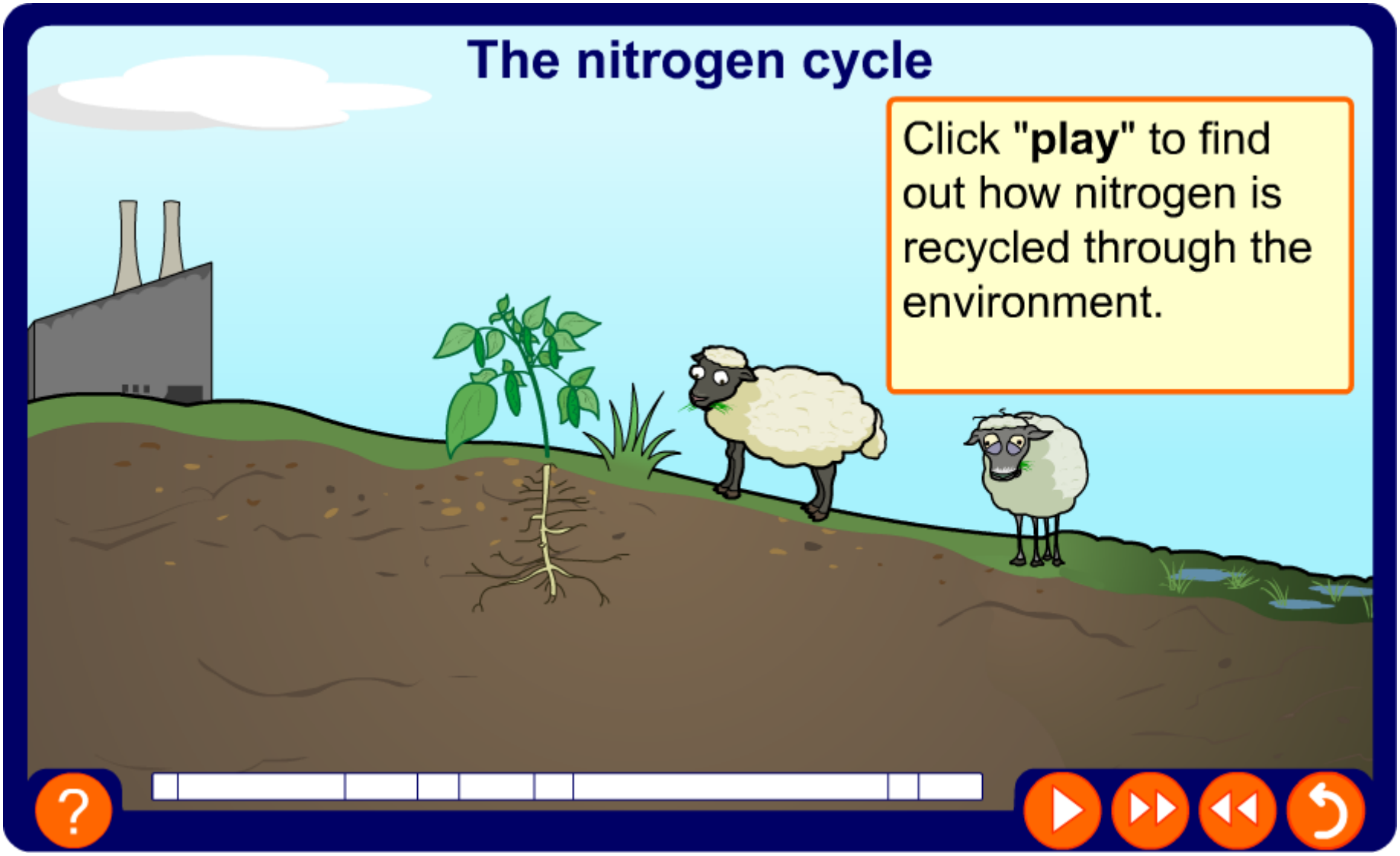


Why are plants unable to use the nitrogen straight from the air?

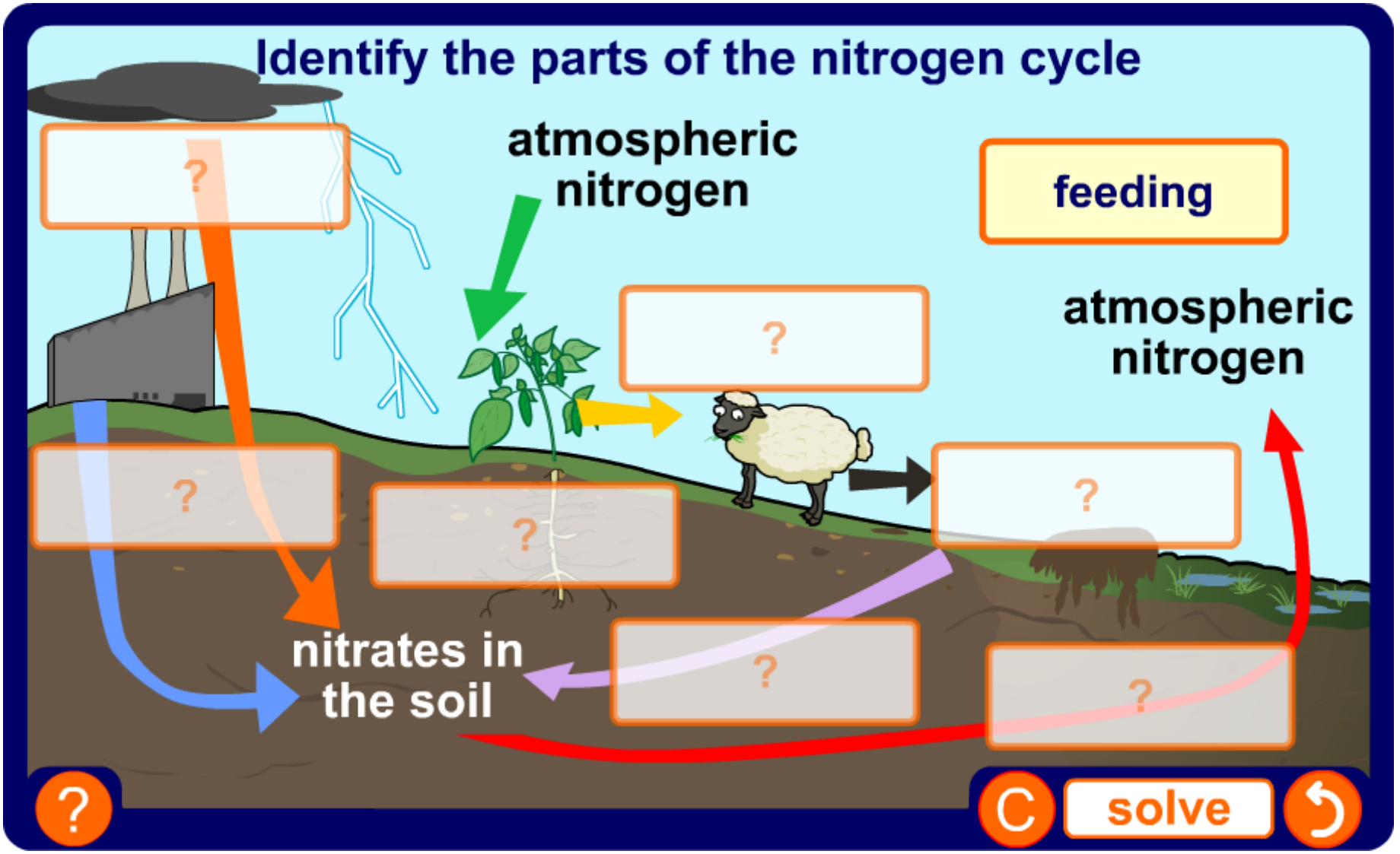
Nitrogen gas (N_2) is unreactive and is not easily converted into other compounds. Most plants can only take up nitrogen in the form of ammonia or nitrate.

How is atmospheric nitrogen changed into a useable form?

What is the nitrogen cycle?



Labelling the nitrogen cycle



Components of the nitrogen cycle

Match the components of the nitrogen cycle to their role

lightning strikes	convert nitrates into nitrogen
nitrifying bacteria	live in the root of legumes and fix nitrogen
denitrifying bacteria	convert ammonia compounds to nitrates
nitrogen-fixing bacteria	convert atmospheric nitrogen to nitrates
decomposers	break down waste and dead matter

?

solve

How are nitrates produced?

Nitrates are important because they are a form of nitrogen that plants can absorb. Nitrogen is used to make protein, and is passed from plants to animals along food chains.

What processes add nitrates to the soil?

- Decomposers release ammonium compounds from waste (such as urine) and dead matter. Nitrifying bacteria then convert the ammonium compounds into nitrates.

- Some nitrogen compounds form during lightning strikes and are washed into the soil by rain water. Lightning provides the high level of energy required for nitrogen to react and form compounds.

Can plants add nitrogen to the soil?

This rugged place is in Iceland. Deforestation by the original settlers and high levels of volcanic activity have left much of the country as bare lava or sand; an environment in which few plants grow.

In the 1960s, the country began to manage its soil, and dropped millions of lupin seeds from the air.

Why might lupins survive where nothing else grows?

What are legumes?

Most plants need nitrates from the soil because the nitrogen in air is too unreactive. These plants rely on the presence of nitrifying bacteria in the soil or artificial fertilizers.

By contrast, lupins and other **legumes**, such as clover and peas, are self-sufficient.

Nitrogen-fixing bacteria living in the root nodules of legumes convert nitrogen gas into nitrates, improving the fertility of poor-quality soils.

How can nitrates be added to soil?

Nitrates are vital for plant growth, but levels in the soil are gradually depleted as crops grow.

What methods can farmers use to increase soil nitrate levels?

- Modern, intensive farming uses artificial fertilizers. These are made by the **Haber process**. However, run-off into nearby rivers and lakes can cause **eutrophication**.

- Organic farming uses manure – a natural fertilizer. Crop rotation, a system that varies the crops planted each season, is also used to maintain soil fertility.

Keeping soil fertile

How do these processes affect soil nitrate levels?

increases nitrates	decreases nitrates

add decomposers

solve