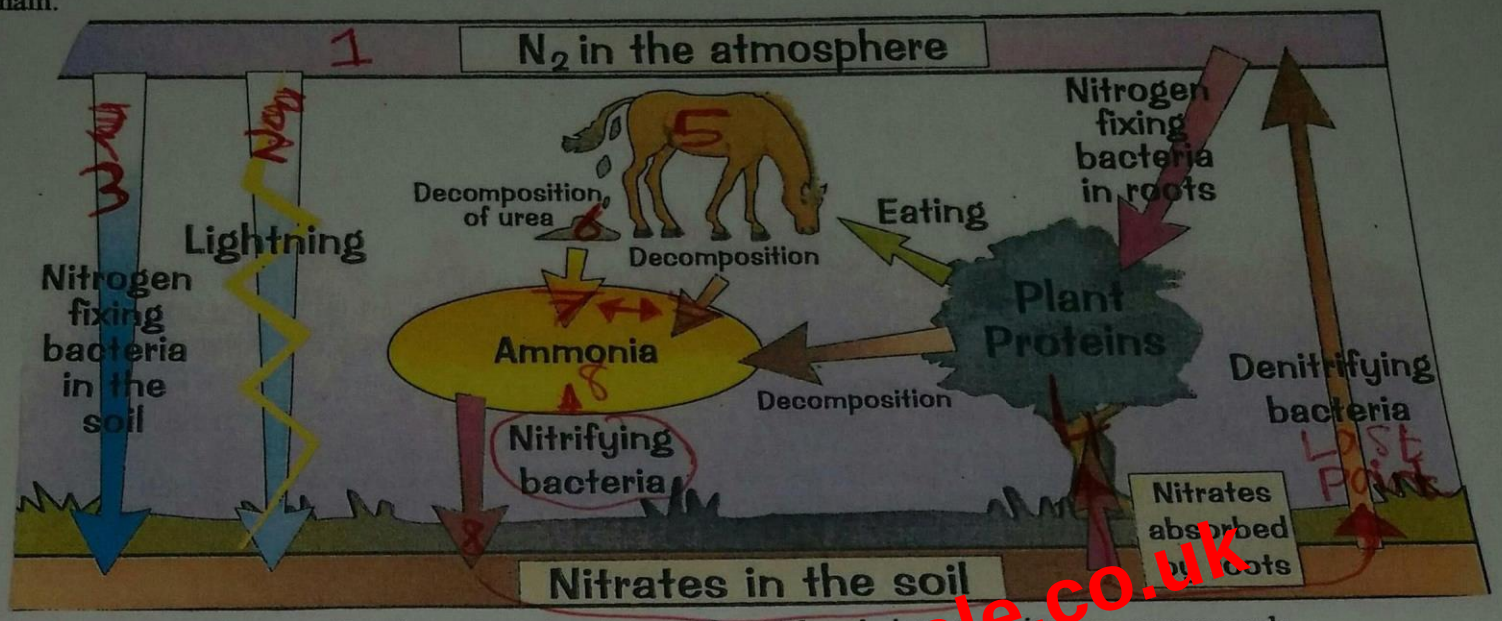
The Nitrogen Cycle

Nitrogen, just like carbon, is constantly being **recycled**. The atmosphere contains **78%** nitrogen gas. The gas is very **unreactive** and can't be used **directly** by plants or animals.

Before plants can use nitrogen it has to be changed into **nitrogen compounds** called **nitrates** (NO_3). Plants **absorb** nitrates from the **soil** and use them to make **protein** for **growth**. **Animals** can only get protein by **eating plants** or **each other** - so nitrogen compounds (nitrates) are passed along the food chain.



A process called **nitrogen fixation** converts nitrogen **from the air** into **nitrogen compounds**, called **nitrates** ($-NO_3$). There are two **natural** nitrogen fixation processes:

1. **Lightning**

   The heat energy of lightning is enough to cause nitrogen (N_2) and oxygen (O_2) in the air to **react** together to form nitrates ($-NO_3$). **Rain** carries the nitrates into the **soil**.

2. **Nitrogen Fixing Bacteria**

   These bacteria live in the **soil** and in **root nodules** of plants called **legumes** (peas, beans and clover). These bacteria convert **nitrogen from the air directly** into **nitrates**.

   The legume plants and bacteria share a **mutualistic** relationship. The bacteria get **glucose** from the plant and the plant gets **nitrates** from the bacteria to make into **proteins**.

There are **three other types** of bacteria involved in the nitrogen cycle.

1. **Decomposer Bacteria**

   These are **bacteria** found in the soil and they break down dead plants and animals. The decomposer bacteria decompose and turn **protein**, from dead plants and animals, and **urea** found in animal waste into **ammonia** (NH_3).

2. **Nitrifying bacteria** – change the **ammonia** (NH_3) in decaying matter into **nitrates** (NO_3).

3. **Denitrifying bacteria** – change **nitrates** in the soil back to **nitrogen gas**, which returns to the atmosphere. These bacteria are of no benefit to plants or animals.