Date _____

Aim: How is nitrogen cycled through the ecosphere?

a.
Atmospheric Nitrogen ($N_{2(g)}$)
(78% of troposphere)

1. **Nitrogen Fixation (inorganic)** -

- lightning causes N_2 gas to combine with oxygen to form nitrates (NO_3^-) that fall with the rain

2. **Nitrogen Fixation (organic)** -
bacteria convert $N_{2(g)}$ to ammonia (NH_3) $N_2 + 3H_2 \rightarrow 2NH_3$

- cyanobacteria (in soil and water)
rhizobium bacteria living in nodules of root systems of legumes (ex. soybeans)

b.
Ammonia (NH_3) and
Ammonium (NH_4^+)ions

3. **Nitrification** - aerobic bacteria convert ammonia to nitrites (NO_2^-) (toxic to plants)

c.
Nitrites (NO_2^-)

4. **Nitrification** - other bacteria convert nitrites to nitrates (NO_3^-)

d.
Nitrates (NO_3^-)

7. **Denitrification**

anaerobic bacteria
(mainly in water-logged soils)
break down nitrates (NO_3^-) to N_2 and N_2O (nitrous oxide) gases

5. **Assimilation** - plants make DNA, amino acids, and proteins after roots absorb nitrates, ammonia, and ammonium ions

6. **Ammonification** - decomposers (fungi & bacteria) convert dead bodies and wastes of plants and animals back into NH_3 and NH_4^+