- In groups of 2-3, prepare at least one "what if" question for each number on the study guide

- Make sure your questions fall into one of the three categories at the top of the study guide

- Your questions should have a scenario and a follow-up ("what if ...; how would that affect ...?")

- Your questions should target answers that focus on the concepts we studied about soil ecology

1. Why are soil organisms important to the ecological health of plants growing in the soil?

→ You should know the factual answer (in your notes)

→ What if... soil organisms all became really big? How might that affect plant growth?

→ Answer (possible, short): "Plants would have trouble getting nutrients."

→ FACTS TO BACK UP ANSWER:

- Plants need nutrients
- Soil organisms drive nutrient cycle
- Smaller organisms make smaller poop particles
- Plants need very small particles

no small organisms? no small poop particles!

1. Why are soil organisms important to the ecological health of plants growing in the soil?

→ How would you answer this ↑

→ "What if..." we pulled all the millipedes from the soil? How would that affect the number of springtails in the soil?

→ FACTS:

→ Some soil organisms eat millipede poop

→ Springtails eat millipede poop and centipede poop and big animal poop.

→ I predict there will be fewer springtails (but not dramatically)

3. Explain how soil organisms can contribute to the decomposition of organic material at the surface of the soil.

(KNOW THE FACTS)

→ What if soil organisms could only break down leaves — but not animal poop? How will this affect plant growth?

→ I predict this will slow down plant growth.

→ FACTS:

- Medium-sized organisms eat animal poop.
- If bugs don't eat poop, it will build up
- All the bugs will still have a food source (but some will have fewer options)

less bugs → less nutrients

4. Why is it that plants can use nutrients in ion forms (such as nitrates - NO_3^-, or calcium – Ca2+) but not organic matter or organic material?

→ What if... (big) animal poop couldn't break down in the soil? How would that affect the amount of nutrients in the soil?

→ Nutrients would stay about the same...

- There's more than one way for the nutrient cycle to proceed
- Plants regulate how many nutrients are in the soil – so if there is less nutrient input from organisms, the plants will remove fewer nutrients from the soil

5. A chunk of soil is removed from the back seat of Mr. Bregar's car and placed in a glass beaker. The mass of the soil and the beaker together is 425 grams. The soil is dried for two days in a drying oven; after it has dried, the mass of the soil and the beaker together is 388 grams. The mass of the beaker alone is 78 grams. What is the water content of this soil?

→ What if soil organisms could process dry soil? How would that affect soil nutrient levels?

→ Moisture?

→ FACTS:

- Nutrients = soil organism poop
- Soil nutrients are transported by water
- Without water, soil nutrients will stay put...

$$\text{Water content} = \frac{\text{mass water}}{\text{mass dry soil}} \times 100\%$$

(mass of wet soil in beaker) − (mass of soil in beaker) = mass of water

(mass of dry soil in beaker) − (mass of beaker) = mass of dry soil

$$\frac{425 - 388}{388 - 78} = \frac{37}{310} \times 100 = 11.9\%$$