Name _____ Date _____

Ecological Succession in Order: How Communities Rebuild After Lava Flows and Fires

Directions: Answer the questions on ecological succession, which include two order sets and a group that uses a table of data from lava flows of different ages.

1. What is the main difference between primary succession and secondary succession?

A. Primary succession starts without soil, while secondary succession starts where soil remains.

B. Secondary succession can begin only after people plant new trees in a disturbed area.

C. Primary succession happens only on land, while secondary succession happens only in lakes and ponds.

D. Primary succession is faster, because soil is already in place when it begins after a fire.

2. Put these stages of primary succession on a new lava flow in the order they typically happen, from bare, cooled rock to forest, in a place with enough rain for trees to grow. Label each stage First, Second, Third or Fourth.

Write the letter of the matching answer on each line.

1. _____ Mosses and grasses take root in the thin soil.
2. _____ Lichens begin growing on the bare rock.
3. _____ Shrubs, and later trees, grow as the soil gets deeper.
4. _____ Broken rock and the remains of lichens form a thin layer of soil.

A. First
B. Second
C. Fourth
D. Third

3. Put these stages of secondary succession in the order they typically happen in an oak and hickory forest of the eastern United States, from the first season after a wildfire to a mature forest. Label each stage First, Second, Third or Fourth.

Write the letter of the matching answer on each line.

1. _____ Shrubs grow up along with young pines, oaks and hickories.
2. _____ Oak and hickory trees grow tall and shade much of the ground below.
3. _____ Annual plants sprout from seeds that survived in the soil or blew in.
4. _____ Grasses and other plants that live for several years spread across the burned area.

A. Second
B. Third
C. First
D. Fourth

4. Why are lichens important as pioneer species on bare lava?

A. They release seeds that grow into the first trees once the lava has cooled down far enough.

B. They help break down the rock and add organic matter, starting the soil later plants need.

C. They keep all other species off the rock, so the lichens stay in charge for good.

D. They warm the rock enough that tree roots can grow straight into the solid stone.

5. Why does a forest usually return faster after a fire than on a brand-new lava flow?

A. Burned ground always gets more rain than a new lava flow in the same region.

B. Soil is already in place after the fire, along with seeds and roots that survived it.

C. Trees can grow straight from ash, without needing any soil or seeds at all.

D. Fire adds so many minerals that every plant afterward grows about twice as fast as usual.

6. In the forest recovering from fire, young oaks and hickories can grow in the shade of the pines, but young pines grow poorly in shade. What does this most likely mean for the forest over time?

A. The pines and hardwoods will stay in exactly the same numbers forever.

B. Pines will gradually replace the oaks and hickories, since pines were there first.

C. No new trees of any kind will grow, since the pines shade all the ground.

D. Oaks and hickories will gradually replace the pines as older pines die.

7. Primary succession begins on two new lava flows, one in a rainy region and one in a dry region. After a very long time, which outcome is most likely?

A. Both regions become the same kind of forest, since succession always ends the same way.

B. Neither region ever supports plants, since lava can never be broken down into soil.

C. The rainy region becomes forest, while the dry region may stay shrubland or grassland.

D. The dry region becomes forest first, since soil forms faster where there is little rain.

Five Lava Flows of Different Ages

In a study, ecologists measured soil depth and counted the species of plants and lichens at five sites on lava flows of different ages. The sites are on one mountainside and were chosen to have similar rainfall, elevation and rock type. Each value is the mean of 3 plots at that site.

Soil and living things at five sites on lava flows of different ages on one mountainside (each value is the mean of 3 plots)

Age of lava flow (years)	Mean soil depth (cm)	Mean number of species of plants and lichens per plot	Main organisms covering the ground
5	0	2	Lichens
40	0.5	6	Lichens and mosses
150	3	14	Mosses, ferns and grasses
400	12	22	Shrubs and young trees
1,500	35	27	Forest trees

8. How did mean soil depth change from the youngest lava flow to the oldest?

A. It decreased, from 35 cm at 5 years to no soil at 1,500 years.

B. It stayed at about 3 cm on the lava flows of every age.

C. It increased, from no soil at 5 years to 35 cm at 1,500 years.

D. It rose to 12 cm at 400 years and then fell back to zero.

9. Which claim do these data support?

A. Older flows had deeper soil and more species on average, which fits soil building that lets more plants grow.

B. The 1,500-year-old site holds a final community that will never change, even after a fire.

C. Soil depth and the number of species showed no connection with each other at these five sites.

D. The data prove that every one of the five sites passed through each stage, since one site was watched for 1,500 years.

10. A sixth site on the same mountainside has a lava flow about 800 years old. Based on the table, which description most likely fits it?

A. Mean soil depth over 70 cm, since soil depth doubles every 100 years on these flows

B. Bare rock with no soil at all, since soil takes at least 1,500 years to start forming

C. Mean soil depth between 12 and 35 cm, with shrubs and trees covering much of the ground

D. Only lichens and mosses, since grasses need at least 1,000 years to reach a new lava flow