WEATHERING, EROSION & DEPOSITION WORKSHEET

Name_____

Tropical rain forests are very hot and steamy places. The average annual temperature is about 25°C. Rainfall is usually between 150 cm and 350 cm per year, with the greatest rainfalls reaching 900 cm per year or more. Many different living things flourish in these warm, moist conditions, but there is a difficult side to these conditions, too. While the plentiful rain and warm temperatures nurture a wide variety of plants and animals, they also make it particularly difficult for tropical rain forests to recover from deforestation.

The problem is that plants and animals cannot use all the water that falls as rain, and the Sun cannot evaporate the excess water. Therefore, excess water runs off the soil, taking nutrients and organic material with it. As a result, the layer of soil that contains nutrients is very thin.

Effects of Rapid Decomposition

Leaves falling from trees are one of the many factors that influence soil nutrients. In tropical rain forests, different trees shed their leaves at different times. This means there is only a thin layer of leaf litter on the ground at any time. Decomposers, such as bacteria and fungi, thrive in hot, wet conditions. The result is that leaf litter and other sources of nutrients break down quickly. Decomposers often can break down dead animals and plants within 24 hours.

Other plants take up the nutrients almost as soon as they are released. Rain forest trees have shallow root systems that allow them to absorb nutrients from the forest floor. They do this so rapidly that nutrients don't have time to be stored in the soil. Therefore, unlike soil in temperate forests, the humus layer of rain forest soil is very thin.

Effects of Deforestation

As long as trees and plants growing in forest soil can quickly absorb the nutrients, many living things can thrive in these conditions. When rain forests are cleared for farming or cattle grazing, however, the soil can support crops or grasses for only a few years. By then, most of the remaining nutrients have been removed. The land is then abandoned. The soil is bare and exposed to the effects of rain, heat, and wind. Erosion quickly washes away the topsoil and any remaining nutrients, leaving behind a subsurface layer called laterite. This soil is colored red by aluminum and iron oxides. Exposed to the hot Sun, this layer can become as hard as concrete. It is nearly impossible for rain forests to regrow under these conditions.

Meanwhile loggers, farmers, and cattle ranchers move to new areas of rain forest and destruction begins again. In some areas, about 2,000 trees per minute are cut down in the rain forests. Scientists estimate that an area of tropical rain forest about the size of the state of Wisconsin is being destroyed every year.

1. Why would it be difficult to replant trees in an area of tropical rainforest that has been cleared? What do you think would have to be done before this could be attempted?

_____

_____

2. How would the soil in a tropical rainforest be different from the soil in a tropical forest that has a wet season and a dry season?

_____

_____

_____

Directions: For each of the situations below, state whether it describes erosion, weathering, or possibly both.

1. Over the course of two years, the top layer of soil at a Michigan farm is blown away.

2. A very large storm occurs along the coast. The powerful waves wash away sand and move some larger rocks on the shore.

3. Rainfall collects in a crack in a rock. When the temperature drops, this water freezes and expands. This causes the crack to become slightly larger.

4. This rock is at the top of a cliff. After several years, the crack is large enough that a piece breaks off and tumbles to the bottom.

5. A tree in your front yard spreads its roots beneath a sidewalk, pushing the sidewalk up and causing it to crack. As the tree grows, these cracks are expanded as the roots grow into and between them.

6. A glacier scrapes pieces of rock from underneath it and carries these pieces down the side of a mountain and into the valley.

7. A river flowing through soft rock dissolves some of the rock and carries this material downstream.

8. As a fire rages through a forest, a large boulder is heated quickly. This rapid change in temperature causes the outer layer of the boulder to crack.

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

9. What is the difference between physical weathering and chemical weathering?

____

_________________________ ____

10. Name an example of the cause for each of the following:

________________________a.physical weathering

________________________b.chemical weathering

11. Identify whether weathering or erosion occurs in each of the following situations:

________________________a.A deep gully forms in a hillside after a rainstorm.

________________________b.A U-shaped valley is carved out as a glacier moves through the mountains.
________________________c.A rock is slowly broken apart by the force of ice thawing and refreezing.
________________________d.Sandstone is worn away by the sediment particles carried in the wind.

Chemical weathering can form large underground caves. Carbon dioxide from the air dissolves in rainwater, creating carbonic acid. When the rainwater seeps into the ground, carbonic acid reacts with calcite in limestone rock layers to form calcium bicarbonate. Unlike calcite, calcium bicarbonate can dissolve in water. It is slowly carried away by water flowing underground. The places that the calcite once filled are left behind as caves. Precipitation, such as rain, sleet, and snow, is naturally slightly acidic because it contains carbonic acid.

12. Explain how underground limestone caves form.

____

________________________________ ____

13. Describe how rainwater can be an agent of chemical weathering.

____

________________________________ ____

14. Explain how humans can cause erosion.

____

____

Read the following paragraphs, and complete the exercises below.

Weathering—the process in which rocks on Earth's surface are changed in form or composition—is the result of physical or chemical processes. Movements of water, ice, and wind are common causes of physical weathering. Carbonic acid and acid rain are two causes of chemical weathering. Living organisms also can cause weathering. For example, plant roots can grow into cracks and slowly break apart rocks. Some mosses and lichens that grow on rocks even produce acids that can dissolve the rock surface. Some animals, including ground squirrels and prairie dogs, uncover buried rock surfaces through digging. These surfaces then become exposed to other forms of weathering. The effects of plants and animals on rock surfaces may seem small compared with the effects of winds, glaciers, acid rains, and other such processes. But over long periods of time, weathering effects from plants and animals can be significant.

15. How do digging animals contribute to the weathering of rocks?

____

____

16. Describe two ways that plants can cause the weathering of rocks.

____

____

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

17. Which type of wind can transport larger sediment particles, high-speed wind or lowspeed wind? Explain your answer.

____

____

18. Is it possible to have erosion without deposition? Explain your answer.

____

____

_______19. _______________occurs when water fills cracks in rock and freezes.

a. Frost wedging b. Deposition c. Chemical weathering d. Oxidation

_____ 20. What causes rock fragments to move down inclines?

a. magnetism b. gravity c. minerals d. magma

_____ 21. Abrasion caused by particles in water is a type of

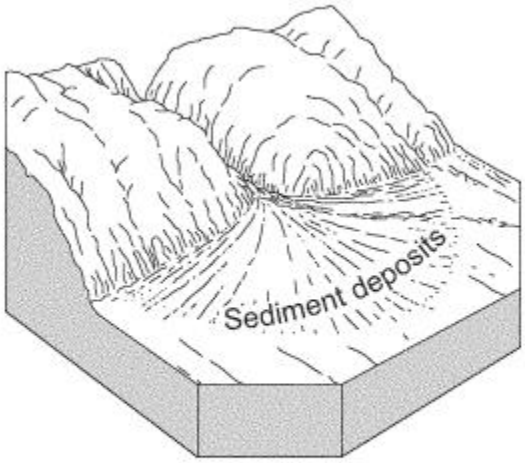
a. acid precipitation. b. sediment deposition. c. physical weathering. d. chemical weathering.

_____ 22. Which process forms ocean cliffs?

a. glacial abrasion b. deforestation c. deposition d. water erosion

_____23. Look at the diagram below to answer this question.

The landscape diagram below shows a fan-shaped pattern of sediment deposits.

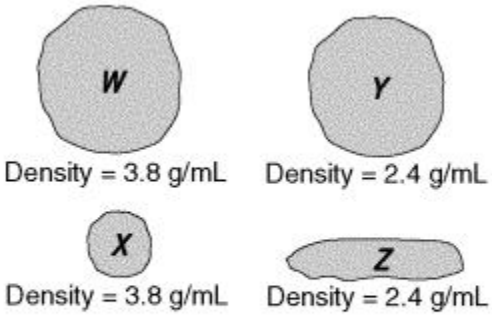


The fan-shaped pattern of these sediments is most likely the result of deposition by

A) prevailing winds
B) ocean waves
C) running water
D) glacial ice

_____24. Look at the diagram below to answer this question.

A stream is transporting the particles *W*, *X*, *Y*, and *Z*, shown below.



Which particle will most likely settle to the bottom *first* as the velocity of this stream decreases?

A) *W* B) *Y* C) *X* D) *Z*

25. Name the 4 factors that influence the rate of deposition. (These are in your notes.

_____

_____