Hoover

Earth and Space Science

Day 1 and 2

Students should review their notes from the previous week and complete the "Rock Quiz"

Day 3 and 4

Read the "Weathering and Erosion Notes" and work on the "Erosion, Deposition, and Weathering worksheet

Make sure to refer to the picture at the bottom of the page when writing your description

Day 5

Refer back to the "Weathering and Erosion Notes" to answer 1 through 9 on the "Mechanical and Chemical Weathering" worksheet

Day 6

Complete the remainder of the "Mechanical and Chemical Weathering" worksheet

Day 7

Complete 1 through 11 on the "Erosion and Deposition" study guide

Day 8

Complete the remainder of the "Erosion and Deposition" study guide

Day 9

Complete all the across clues for the "Weathering and Erosion Crossword Puzzle"

Day 10

Complete all the down clues for the "Weathering and Erosion Crossword Puzzle"

Name _____ Period _____

Rocks Quiz

Directions: Write the letter of the best answer in the blank.

_____ 1. What is the difference between magma and lava?
   a. They are exactly the same
   b. Magma is on the surface, lava is underground
   c. Magma is underground, lava is on the surface
   d. Magma is cooler than lava

_____ 2. Magma forms what type of rocks?
   a. Igneous
   b. Sedimentary
   c. Metamorphic
   d. None of the above

_____ 3. What type of rocks may contain evidence of past life (fossils)?
   a. Igneous
   b. Sedimentary
   c. Metamorphic
   d. All of the above

_____ 4. The physical and chemical processes that transform sediments into sedimentary rocks are called _____.
   a. Lithification
   b. Sedimentation
   c. Petrification
   d. Deposition

_____ 5. Which of the following is a true statement?
   a. Temperature decreases with depth
   b. Pressure increases with depth
   c. As pressure increases, melting point decreases
   d. Temperature overcomes the effect of pressure at high depths

_____ 6. _____ occurs when magma remains a mixture of both molten and solid rock due to the different melting points of materials.
   a. Incomplete melting
   b. Fractional melting
   c. Partial melting
   d. Decreased melting

_____7. Sedimentary rocks are formed from two processes during lithification: _____ and _____
   a. Bedding and rippling
   b. Erosion and deposition
   c. Compaction and cementation
   d. None of the above

_____ 8. Which of the following is true about metamorphic rocks?
   a. They form from preexisting rocks
   b. They form when rocks are melted
   c. They always appear to have layers
   d. None of the above

_____ 9. _____ is the process of minerals crystallizing at different times
   a. Spaced crystallization
   b. Fractional crystallization
   c. Partial crystallization
   d. Feldspar crystallization

_____ 10. What is the difference between intrusive and extrusive igneous rocks?
   a. Intrusive have larger crystals than extrusive
   b. Extrusive rocks form on the Earth's surface, intrusive are below the surface
   c. Intrusive form from magma, extrusive form from lava
   d. All of the above

_____11. _____ are small pieces of rock that are moved and deposited by water, wind, glaciers and gravity.
   a. Sediments
   b. Rocks
   c. Gravel
   d. Dirt

_____ 12. The type of metamorphism that occurs when extremely hot water reacts with rock and alters its chemical composition is called _____.
   a. Regional
   b. Contact
   c. Hydrothermal
   d. Temperate

Weathering and Erosion Notes

Weathering

- The process in which materials on or near Earth's surface break down and change
- Two types: mechanical and chemical

Mechanical Weathering

- Type of weathering in which rocks and minerals break down into smaller pieces
- Also called physical weathering
- Does not involve any change in a rock's composition, only changes in the size and shape of the rock
- Involves a variety of factors including changes in temperature and pressure

Effect of Temperature on Mechanical Weathering

- If the temperature drops to the freezing point, water freezes, expands, exerts pressure on rocks, and can cause the cracks in the rocks to widen
- When the temperature increases, ice melts in the cracks and rock layers
- The freeze-thaw cycle of water in the cracks of rocks is called **frost wedging**

Effect of Pressure on Mechanical Weathering

- Roots of trees/plants can exert pressure on rocks when they wedge themselves into the cracks in rocks; as the roots grow and expand, they exert increasing pressure which often causes the rock to split
- Bedrock at great depths is under tremendous pressure; if the overlying rock layers are removed the pressure is reduced allowing the bedrock to expand and cracks can form

Exfoliation

- After a rock body is uplifted as a result of geological processes, fine cracks may develop in the rock due to a decrease in pressure
- Process by which outer rock layers are stripped away in succession (similar to the way an onion's layers can be peeled)
- Often results in dome-shaped formations

Chemical Weathering

- Process by which rocks and minerals undergo changes in their composition
- Agents of chemical weathering include: water, oxygen, carbon dioxide, and acid precipitation
- Interaction of the agents with rock can cause some substances to dissolve and some new minerals to form
- Newly formed minerals have properties different than those of the original rock
- Composition determines the effects that chemical weathering will have
    - Some minerals can completely decompose
    - Some minerals show very little effect

Effect of Temperature on Chemical Weathering

- Influences the rate at which chemical reactions occur
- Reaction rates increase as temperature increases

Effect of Water on Chemical Weathering

- Can dissolve many kinds of minerals and rocks
- Can react with minerals in a chemical reaction

Effect of Acid Precipitation

- Caused by sulfur dioxide, carbon dioxide, and nitrogen oxides
- These gases combine with oxygen and water in the atmosphere and form strong sulfuric, nitric and carbonic acids
- Because strong acids can be harmful to many organisms and destructive to human-made structures. Acid precipitation often creates problems

Rate of Weathering

- Natural weathering of earth materials occurs slowly
- Climate is the major influence on the rate of weathering
- Interaction between temperature and precipitation in a given climate determines the rate of weathering in a region

Rate of Chemical Weathering

- Greatest effects along the equator
- Rapid in climates with warm temperatures, abundant rainfall, and lush vegetation
- These conditions produce soils rich in organic matter; water from heavy rainfalls combines with the carbon dioxide in soil organic matter and produces high levels of carbonic acid which accelerates the weathering process

Rate of Physical Weathering

- Break down more rapidly in cool climates
- Highest rates in areas where water undergoes repeated freezing and thawing
- Little or no chemical weathering occurs in areas that are frigid year-round

Erosion and Deposition

- Erosion – removal of weathered rock and soil from its original location
- Deposition – eroded materials are dropped in another location
- Gravity tends to pull materials downslope and plays a major role in both erosion and deposition

Erosion by Water

- Perhaps the most powerful
- Can reshape entire landscapes
- Greatest when a large volume of water is moving rapidly
- Can be destructive

Glacial Erosion

- Erosional effects are large-scale and dramatic
- Scrape and gouge out large sections of Earth's landscape
- Glaciers can carry huge rocks and debris over great distances and grind rocks beneath them

Wind Erosion

- Major agent in arid and coastal regions with little vegetation to hold soil in place
- Can be devastating
- Wind-blown particles can damage both natural and human-made structures

Erosion by Living Things

- As plants and animals carry out their life processes, they frequently move Earth's surface materials from one place to another (examples: animals burrowing or sediment being moved by roots)
- Humans excavate large areas and move soil from one location to another

Name:

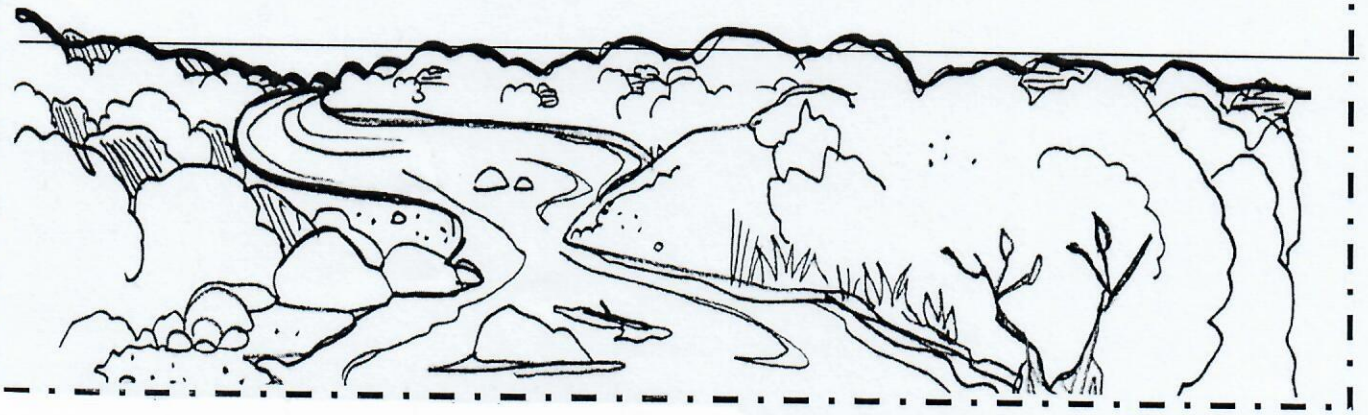
Erosion, Deposition and Weathering

Look at the picture below. Describe how erosion, deposition and weathering could all happen with wind, and a fast running river.

Erosion

Weathering

Deposition



Name _____ Period _____

Mechanical and Chemical Weathering

Directions: Determine whether the following are examples of mechanical (M) or chemical (C) weathering and write your answer in the blank.

_____ 1. Rock is dissolved by carbonic acid

_____ 2. Abrasion – one rock bumps against another rock

_____ 3. Frost wedging

_____ 4. Rocks containing iron turn to rust

_____ 5. Water reacts with salt found in a rock

_____ 6. Forests damaged by acid rain

_____ 7. A plant's roots grow into a crack causing it to break

_____ 8. Burning fossil fuels changes the pH of water

_____ 9. Animals break apart rocks as they dig for food

_____ 10. Decaying remains of plants dissolve rock

_____ 11. Humans blasting rock during construction

_____ 12. Limestone caverns form when carbonic acid flow through cracks

_____ 13. Potholes form on the roads

_____ 14. Bacteria weather rock to access nutrients

_____ 15. Changes in temperature cause rocks to expand and contract

_____ 16. The Statue of Liberty turned green

_____ 17. Overlying materials are removed causing rocks to fracture

_____ 18. Glaciers grind rocks as they move

Name _____ Period _____

Erosion and Deposition

For each item in Column A, write the letter of the matching item in Column B.

Column A		Column B
_____	**1.** The final stage of the erosional process in which materials are dropped in another location	**a.** slope
_____	**2.** The force that tends to pull all materials downhill	**b.** ocean waves
_____	**3.** The steeper the _____, the greater the potential for flowing water to erode earth materials.	**c.** wind
_____	**4.** Coastal areas undergo erosion by _____ and wind.	**d.** glaciers
_____	**5.** Erode by scraping, gouging, and picking up large rocks and debris piles	**e.** gravity
_____	**6.** A major erosional agent in areas with limited precipitation and high temperatures	**f.** deposition

For each statement below, write true *or* false.

_____ **7.** The constant movement of water and the availability of accumulated weathered material creates continuous erosion.

_____ **8.** Unlike water, glaciers do not move material over a long distance.

_____ **9.** Wind is a major erosional agent in areas on Earth that have both limited precipitation and high temperatures.

_____ **10.** The movement of soil and other Earth materials by humans as they build highways and bridges, is not considered erosion.

_____ **11.** Winds cannot blow against the force of gravity.

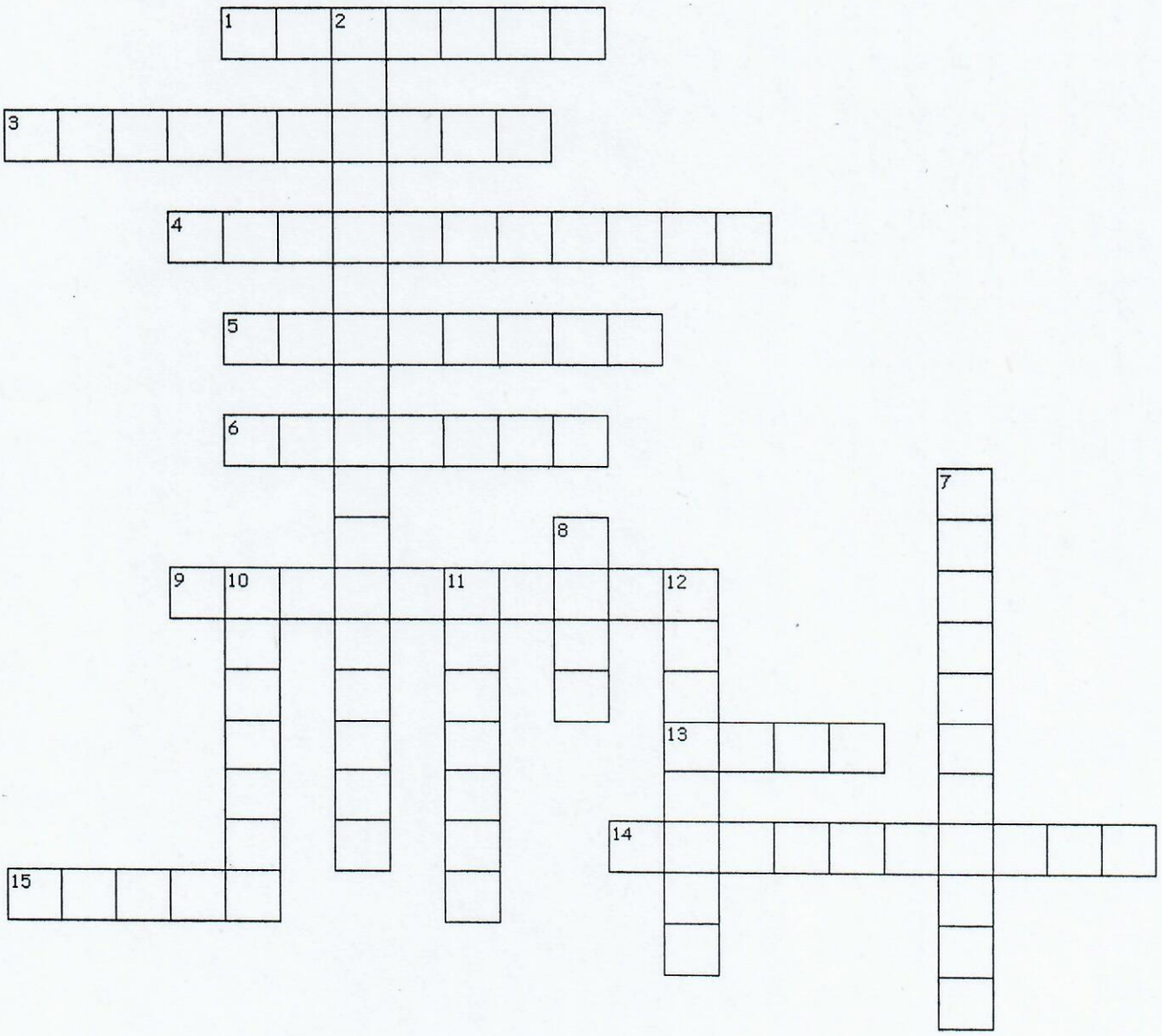
Use the terms below just once to complete the passage.

water	**acid precipitation**	**carbonic acid**	**carbon dioxide**
temperature	**mechanical**	**composition**	**pressure**

The process by which rocks and minerals break down into smaller pieces is **(12)** _____ weathering, also called physical weathering. Two factors that play a significant role in this type of weathering are **(13)** _____ and **(14)** _____. To some extent, the **(15)** _____ of rocks determines the effects that chemical weathering will have on them. **(16)** _____ is an important agent in chemical weathering because it can dissolve many kinds of minerals. An atmospheric gas that contributes to the chemical weathering process is **(17)** _____, which is produced by living organisms. When this gas combines with water, it produces a weak acid called **(18)** _____. Another agent of chemical weathering is **(19)** _____, which is caused mainly by emissions of sulfur dioxide and nitrogen oxides.

Name _____ Period _____

Weathering and Erosion Crossword Puzzle



Across

1. plays a major role in both erosion and deposition
3. type of weathering in which rocks and minerals break down into smaller pieces
4. influences the rate at which chemical reactions occur
5. type of weathering in which rocks and minerals undergo changes in their composition
6. major influence on the rate of weathering
9. process in which materials break down and change
13. physical weathering occurs more rapidly in _____ climates
14. eroded materials are dropped in another location
15. erosion by _____ is perhaps the most powerful

Down

2. caused by sulfur dioxide, carbon dioxide, and nitrogen oxides
7. outer rock layers are stripped away in succession
8. major erosion agent in arid and coastal regions
10. chemical weathering has the greatest effect along the _____
11. removal of weathered rock and soil from its original location
12. can carry huge rocks and debris great distances

Word Bank

gravity	acid precipitation	mechanical	exfoliation
temperature	chemical	cool	equator
climate	glaciers	wind	erosion
weathering	deposition	water	