

LESSON E&S 8.1 – THE PROPERTIES OF WATER

EVIDENCE NOTEBOOK

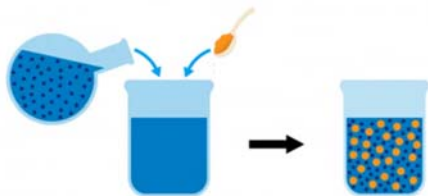
KEY IDEAS

1. Water and caves
 - a. When water seeps down into caves, what is the main component of limestone it can take with it?

 - b. Cave deposits that cling to the ceiling are called _____. Cave deposits that reach the floor are called _____. When these deposits connect with each other it is known as a _____.

2. Solvents, solutes, and solutions.
 - a. Explain the differences between solvents, solutes, and solutions:

 - b. Properly label the components in the diagram below:



3. The Universal Solvent
 - a. Illustrate a water molecule using proper geometry, label the hydrogen and oxygen atoms, and include the partial charges:

 - b. Which side of the water molecule would surround a positively charged solute?

NAME: _____ DATE: _____ PERIOD: _____

- c. Which side of the water molecule would surround a negatively charged solute?
 - d. When water's movement _____ sediments can be deposited. When river water slows down into oceans it can form a _____.
 - e. How are canyons formed?
 - f. Explain how water's polar properties are important to biological systems?
4. The Unique Nature of Ice
- a. What is the trend in density of most substances (not water) as they phase change from a gas→liquid→solid?
 - b. How does water differ from most substances when it freezes?
5. Ice as an Agent of Weathering
- a. How does water weather stone and cement?
 - b. What is this process called?
 - c. How do natural spires form?
 - d. What will eventually happen to Bryce Canyon's unique features?

6. Specific Heat Capacity
 a. What is specific heat?

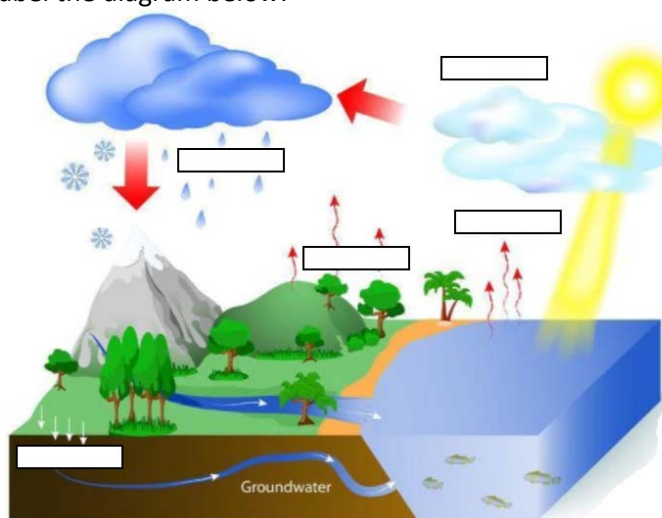
Substance	Specific Heat (J/Kg °C)
Water (l)	4182
Cement (s)	920
Carbon dioxide (g)	844
Oxygen (g)	918
Nitrogen (g)	1040
Water (g)	1864

- b. Explain why liquid water does not change temperature as quickly as cement (rocks or soil).
- c. Earth's atmosphere is about 78% nitrogen. Of the choices above, increasing the concentration of which gas will trap the most heat in that area?
- d. Name a location where this is more likely to happen.

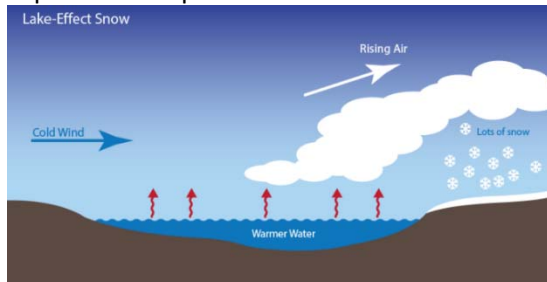
7. Water and Landmass

- a. Because water has a _____ specific heat, coastal areas tend to be more _____ while inland areas tend to be more _____ in temperature.
- b. The Moon has no water or atmosphere, it is mostly rock. It is the same distance from the Sun as Earth is. Would you expect the temperature on The Moon to be more moderate or more extreme than on Earth?
- c. Why?

8. The Water Cycle: Label the diagram below:



9. Explain the steps that causes lake-effect snow.



CHECKPOINTS

10. What are some fundamental properties of water? *Choose all that apply.*
 - a. It is a universal solvent.
 - b. It can hold a large amount of heat.
 - c. It has the ability to corrode rocks.
 - d. It expands when it transitions to a solid

11. How do the properties of water lead to erosion of rock features on land?

12. How does the structure of the water molecule lead to its ability to dissolve polar compounds?
 - a. It is a polar compound.
 - b. It is a bent compound.
 - c. It exists in all three phases on Earth's surface.
 - d. It expands when it freezes.

NAME: _____ DATE: _____ PERIOD: _____

13. How do the properties of water produce the features seen in caves?

14. How do the properties of water break down rocks?

15. What factors affect lake-effect snow?

16. How does the structure of the water molecule make it a good solvent?
 - a. It can be found in all three phases of matter at Earth's surface.
 - b. It is polar.
 - c. It has a partial neutral charge.
 - d. It can dissolve organic compounds

17. Why should a community in Maine set aside additional revenue to repair roads in the spring, but this may not be necessary in Texas?

18. Predict how the climate of an island might be affected by the surrounding ocean.

19. What might be a reason for the difference in the climate conditions between a city on the coast and one far from the coast?
 - a. The ocean has a moderating effect on the climate of the city near the coast.
 - b. The land has a moderating effect on the climate of the city far from the coast.
 - c. The city on the coast receives more sunlight.
 - d. The city far from the coast is drier

20. What process is responsible for forming spires of rock like those in Bryce Canyon?

21. Describe the water cycle, being sure to include all three phases of water.

22. How might the climate differ on the planet if large amounts of water were trapped in glaciers (blocks of ice) on land?
23. Why might a city spend money patching cracks in a road rather than laying out a new road?
24. Caves primarily form in rocks made of limestone. Why is limestone a particularly good cave-forming rock?
- It breaks apart very easily by frost wedging.
 - It is made of the mineral silica, which easily breaks down in the presence of water.
 - It is not dissolved by water.
 - It is made of the mineral calcite, which easily breaks down in the presence of water.
25. If substance A has a higher specific heat capacity than substance B, which of the following is true?
- Substance A dissolves polar molecules better than substance B.
 - Substance B freezes at a higher temperature than substance A.
 - Substance A requires more energy to change its temperature than substance B.
 - Substance B changes temperature more slowly than substance A.
26. Why do containers sometimes break in the freezer?
- They dissolve in water as their temperatures decrease.
 - Water's volume increases as it freezes.
 - Water contracts as it freezes.
 - Water creates small cracks in containers as it freezes
27. What is the relationship between solvents and solutes?
- Solutes are polar, solvents are nonpolar
 - Solutes dissolve solvents
 - Solvents are polar, solutes are nonpolar
 - Solvents dissolve solutes.
28. What is a common form of mechanical weathering that results from the freezing and thawing of rock and that is strong enough to split even huge boulders?
- Abrasion
 - Crackling
 - Exfoliation
 - Ice wedging

29. In a climate with regular precipitation and freezing temperatures, what would happen to the spaces inside of porous rock?
- The spaces would get bigger because the water would expand as it freezes.
 - The spaces would collapse because of the weight of the ice formed on top of the rock.
 - The spaces would stay the same regardless of the amount of precipitation or freezing temperatures.
 - The spaces would get smaller because water from precipitation would push the rock together after freezing.
30. Deltas sometimes form where rivers meet large bodies of water. What role does the movement of the water have on the formation of deltas?
- Sediments are carried by fast-moving water far into a large body of water.
 - Sediments are picked up where a river meets a large body of water and are carried away.
 - Sediment falls out of water when a slow-moving river speeds up after it meets a large body of water.
 - Sediment falls out of water when a fast-moving river slows down after it meets a large body of water.
31. When water runs through limestone, caves are sometimes formed. If water drips slowly in the same place inside one of these caves, what will occur?
- Stalagmites and stalactites will not form in this area because they require fast-moving water to form.
 - Stalactites and stalagmites will break off in the cave because the water will weather and erode them away.
 - Stalactites will form connected to the ceiling, and stalagmites will form connected to the floor because the minerals will be deposited in the cave.
 - Stalagmites will form connected to the ceiling, and stalactites will form connected to the floor because the minerals will be deposited in the cave.
32. Small streams are often found at the bottom of narrow valleys. What process occurs to make this true?
- Water freezes and cracks the land, creating valleys.
 - Streams erode rocks and carry sediment away, creating valleys.
 - Streams flowing through valleys drop sediment into valley floors.
 - The rocks at the bottom of narrow valleys have a higher porosity than other rocks, allowing the water to flow along the valley.
33. What property of water allows frost wedging to occur?
- Water absorbs energy.
 - Water transmits sunlight.
 - Water expands upon freezing.
 - Water dissolves and transports materials.

NAME: _____ DATE: _____ PERIOD: _____

34. What is the most common form of water on the surface of Earth?

- a. Ice
- b. Liquid
- c. Plasma
- d. Water vapor

35. A new road was just built in an area with rainy days and freezing nights. Engineers expect that, over time, holes will form in the road. What will cause the holes to form?

36. Compare the way water as a liquid and water as a solid affect Earth's surface.

37. Explain how large bodies of water can impact the weather of the surrounding area.