Worksheet 2 **Period** ____ **Name** _____
AP Biology / Bratcher Water

Ionic and polar substances are hydrophilic. Nonpolar and nonionic compounds are hydrophobic. Indicate whether the following is hydrophobic or hydrophilic. Then if polar, nonpolar, ionic bonds.

1. Olive oil _____ / _____

2. Sugar _____ / _____

3. Salt _____ / _____

4. Candle wax _____ / _____

5. Given that ^{12}C, ^{1}H, ^{16}O - how many grams of lactic acid ($C_3H_6O_3$) are in a 0.5 M solution of lactic acid? (show your work)

6. Given that ^{23}Na, ^{34}Cl - how many grams of salt, NaCl, must be dissolved in water to make 2 liters of a 2M salt solution? (show your work)

7. Complete the following table:

Property	Explanation of Property	Example of Benefit to Life
a.	Hydrogen bonds hold molecules together and adhere them to hydrophilic surfaces.	**b.**
High specific heat	**c.**	Temperature changes in environment and organisms are moderated.
d.	Hydrogen bonds must be broken for water to evaporate.	**e.**
f.	Water molecules with high kinetic energy evaporate; remaining molecules are cooler.	**g.**
Ice floats	**h.**	**i.**
j.	**k.**	Most chemical reactions in life involve solutes dissolved in water.

___ 8. We can be sure that a mole of table sugar and a mole of vitamin C are equal in their

a. weight in daltons
b. weight in grams
c. number of molecules
d. number of atoms
e. volume

___ 9. What is an example of a hydrophobic material?

a. paper b. table salt c. wax d. sugar e. pasta

___ 10. For two bodies of matter in contact, heat always flows from

a. the body with greater heat to the one with less heat
b. the body of higher temperature to the one of lower temperature
c. the denser body to the less dense body
d. the body with more water to the one with less water
e. the larger body to the smaller body

___ 11. What accounts for the movement of water up xylem vessels in a plant?

a. cohesion
b. hydrogen bonding
c. adhesion
d. hydrophilic vessel walls
e. all the above

___ 12. A buffer

a. Δ pH by a magnitude of 10
b. absorbs excess OH^-
c. releases excess H^+
d. is often a weak acid-base pair
e. maintains pH at a value of 7

___ 13. What bonds must be broken for water to vaporize?

a. polar covalent bonds
b. nonpolar covalent bonds
c. hydrogen bonds
d. ionic bonds
e. a and c are correct

___ 14. Adding a base to a solution would

a. raise the pH
b. lower the pH
c. decrease $[H^+]$
d. do both a and c
e. do both b and c

___ 15. The ability of water molecules to form hydrogen bonds accounts for water's

a. high specific heat
b. evaporative cooling
c. high heat of vaporization
d. cohesiveness and surface tension
e. all the above

___ 16. The following are pH values; cola – 2; organge juice – 3; beer – 4; coffee – 5; human blood – 7.4. Which of these liquids has the highest molar concentraion of OH^-?

a. cola b. orange juice c. beer d. coffee e. human blood

___ 17. Acid precipitation has lowered the pH of a particular lake to 4.0. What is the hydrogen ion concentration of the lake?

a. 4.0 M b. 10^{-10} M c. 10^{-4} M d. 10^{4} M e. 4%

___ 18. The molarity of a solution is equal to

a. Avogadro's number of molecules in 1 liter of solvent
b. the number of moles of a solute in 1 liter of solution
c. the molecular weight of a solute in 1 liter of solution
d. the number of solute particles in a 1 liter of solution
e. 342g if the solute is sucrose

___ 19. Some archaebacteria are able to live in lakes with pH values of 11. How does pH 11 compare with the pH 7 typical of your body cells?

a. It is four times more acidic than pH 7.
b. It is four times more basic than pH 7.
c. It is a thousand times more acidic than pH 7.
d. It is a thousand times more basic than pH 7.
e. It is ten thousand times more basic than pH 7.

___ 20. Temperature is a measure of

a. specific heat
b. average kinetic energy of molecules
d. total kinetic energy of molecules
d. Celsius degrees
e. joules

21. Describe why water is an ideal medium for living things.