Review - Section 4D

Name: _____

1) Rank the different sources of water from highest to lowest percentage on this planet.
Ocean water is the highest percentage, followed by glaciers, groundwater and rivers and lakes

2) What is the difference between ocean water and freshwater?
Ocean water has fairly large concentrations of salt in it (usually NaCl and $CaCl_2$) of about 3.5%. Freshwater does not have the salt in it. Salt in freshwater is less than 0.05%.

3) Describe the water cycle.
Water from oceans and other reservoirs evaporate into the atmosphere. Wind moves the water over the land in the form of clouds. Clouds eventually rain down and the water that falls on land flows downhill (due to gravity) to get back to the ocean.

4) Why does water that falls from the sky not have salt in it?
When water evaporates, only the water evaporates. The salt does not evaporate and remains in the ocean water.

5) Ocean water and freshwater drunk directly from the source will make a person sick. In both cases, why?
Ocean water has salt in it, which will dehydrate a person. The body will remove the salt, and use the water plus more to remove it. Freshwater has microorganisms and/or chemicals in it that could make us sick.

6) List the steps of water purification by the city, in order.
Screening, pre-chlorination, flocculation and settling, sand filtration, post chlorination, and optional fluoridation, charcoal adsorption and pH balancing.

7) Why does this process work for freshwater but not for ocean water?
This process cannot remove the dissolved salt in the water. Since freshwater has no salt in it, and the other dissolved minerals are not as harmful, this process removes the unhealthy components.

8) Describe two processes that can be done to purify ocean water, and why they work.
Distillation is a process in which water is boiled to remove impurities. The water boils, but the impurities do not. The water is then collected, cooled back down into a liquid giving pure water.

Reverse osmosis is a process where water is pushed through a semipermeable membrane. The water can go through the membrane, but the salt and other impurities do not, producing fairly clean water.

9) What is the difference between hard water and soft water?

Hard water contains calcium, iron or magnesium ions dissolved in the water. These ions can dry out skin, leave spots on dishes and fade colors on clothing. Soft water does not contain these ions.

10) Water softeners are machines that remove hard water ions and replace them with soft water ions. How does this machine work?

A water softener uses an ion exchange resin. As hard water flows into the softener, the hard water ions are removed and replaced with soft water ions (like sodium). Scheduled, usually overnight, the softener will run salt water through the machine in order to flush out the hard ions, so that the softener can work the next morning

11) Water stored in a water tower has chlorine in it. Why do we put chlorine in the water after cleaning?

This is done to prevent any microorganisms from growing in the water while it is stored or in the pipes coming to your house.

12) In the water purification lab, we did three things to test the water for purity. How did each of the following show water purity?

a) microscope - shows dirt and microorganisms that may remain in the water.

b) laser shine through it - looks for "floaties", small particles that cannot be seen with the naked eye that may be floating in the water. These particles are big enough to reflect the laser.

c) conductivity tester - tests for dissolved ions in the water, like chlorine or hard water ions.

13) In the water softening lab, we used three different softeners to see their water softening effectiveness. A student's data is shown below. Which was the best softener, based on the data?

	Hard Water	Treated w/ Sand	Treated w/ Calgon	Treated w/ Resin
Reaction to Na_2CO_3	Turned cloudy	Turned cloudy	No change	No change
Reaction to ivory soap	Murky water	Murky water	No change	A little murky
Height of suds when shaken	10 cm	8 cm	2 cm	4 cm

Calgon did the best - no reaction and least suds. Reactions mean the presence of hard water ions.

14) In the purification of the ocean water lab, we filtered and distilled ocean water to see which process worked better. A student's data is shown below. Which was the better purifier, based on the data?

	Ocean Water	Filtered	Distilled
Reaction to $AgNO_3$	Turned cloudy	Turned cloudy	No change
Reaction to Na_2CO_3	Cloudy	Cloudy	No change

Distilled water is the better purifier, It did no react with AgNO3 or Na2CO3, which shows chlorine and calcium.

15) Describe how the following conditions could cause a fish kill?

a) low pH
- Acidic, burn skin of fish

b) high organic carbon
- Too much food, could eat too much

c) high pesticides
- toxic to fish in large amounts

d) high heavy metals
- toxic to fish in large amounts