Section 2–2 Properties of Water (pages 40–43)

TEKS FOCUS: 2B Collect data and make measurements with precision; 2C Organize data

This section describes the makeup of water molecules. It also explains what acidic solutions and basic solutions are.

The Water Molecule (pages 40–41)

1. Is the following sentence true or false? A water molecule is neutral. ________ true

2. What results from the oxygen atom being at one end of a water molecule and the hydrogen atoms being at the other end? The oxygen end of the molecule has a slight negative charge and the hydrogen end has a slight positive charge.

3. Why is a water molecule polar? There is an uneven distribution of electrons between the oxygen and hydrogen atoms.

4. Circle the letter of each sentence that is true about hydrogen bonds.
   a. A hydrogen bond is stronger than an ionic bond.
   b. The attraction between the hydrogen atom on one water molecule and the oxygen atom on another water molecule is an example.
   c. A hydrogen bond is stronger than a covalent bond.
   d. They are the strongest bonds that form between molecules.

5. Complete the table about forms of attraction.

<table>
<thead>
<tr>
<th>Form of Attraction</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohesion</td>
<td>Attraction between molecules of the same substance</td>
</tr>
<tr>
<td>Adhesion</td>
<td>Attraction between molecules of different substances</td>
</tr>
</tbody>
</table>

6. Why is water extremely cohesive? It is very cohesive because of hydrogen bonding.

7. The rise of water in a narrow tube against the force of gravity is called capillary action.

8. How does capillary action affect plants? Capillary action is one of the forces that draws water out of the roots of a plant and up into its stems and leaves.
Solutions and Suspensions (pages 41–42)

9. What is a mixture? A mixture is a material composed of two or more elements or compounds that are physically mixed together but not chemically combined.

10. A mixture of two or more substances in which the molecules of the substances are evenly mixed is called a(an) _______ solution _______.

11. The greatest solvent in the world is _______ water _______.

12. What is a suspension? A suspension is a mixture of water and nondissolved substances that are so small they do not settle out.

13. Complete the table about substances in solutions.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Definition</th>
<th>Saltwater Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solute</td>
<td>Substance that is dissolved</td>
<td>Table salt</td>
</tr>
<tr>
<td>Solvent</td>
<td>Substance in which the solute dissolves</td>
<td>Water</td>
</tr>
</tbody>
</table>

Acids, Bases, and pH (pages 42–43)

14. Two water molecules can react to form _______ ions _______.

15. Why is water neutral despite the production of hydrogen ions and hydroxide ions? It is neutral because the number of positive hydrogen ions produced is equal to the number of negative hydroxide ions produced.

16. What does the pH scale indicate? It indicates the concentration of H⁺ ions in solution.

17. On the pH scale below, indicate which direction is increasingly acidic and which is increasingly basic.

[Diagram showing pH scale with labels for Stomach acid, Lemon juice, Normal rainfall, Pure water, Human blood, Sea water, Soap, Bleach]
18. How many more H⁺ ions does a solution with a pH of 4 have than a solution with a pH of 5? 10 times

19. Circle the letter of each sentence that is true about acids.
   a. Acidic solutions have pH values below 7.
   b. An acid is any compound that forms H⁺ ions in solution.
   c. Strong acids have pH values ranging from 11 to 14.
   d. Acidic solutions contain higher concentrations of H⁺ ions than pure water.

20. Circle the letter of each sentence that is true about bases.
   a. Alkaline solutions have pH values below 7.
   b. A base is a compound that produces OH⁻ ions in solution.
   c. Strong bases have pH values ranging from 11 to 14.
   d. Basic solutions contain lower concentrations of H⁺ ions than pure water.

21. What are buffers? Buffers are weak acids or bases that can react with strong acids or bases to prevent sharp, sudden changes in pH.