Chapter 3, Lesson 5 Activity Sheet Answers

1. Alcohol and water do not have the same density. We know that water is more dense than alcohol because the candle floats in water, but sinks in alcohol. Because the candles are identical, the water must be more dense than the candle and the alcohol must be less dense than the candle.

2. When equal volumes of water and alcohol are placed on a balance, the water is heavier. This must mean that water is more dense. According to D=m/v, if the volume of the two samples is the same, then the sample with the greater mass will be the one that is more dense.

3. The alcohol floats on the oil because it is less dense than the oil. The water sinks in the oil because it is more dense than the oil.

4. The calculated density of water is greater than the calculated density of oil. Because substances with greater density sink when they are placed in substances of less density, water sinks in oil.

The calculated density for alcohol was less than the calculated density for oil. Because less dense substances float in substances of greater density, the alcohol floats on the oil.

5. 

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Density</th>
</tr>
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<tbody>
<tr>
<td>Dawn</td>
<td>Least</td>
</tr>
<tr>
<td>Saltwater</td>
<td>In-between</td>
</tr>
<tr>
<td>Corn Syrup</td>
<td>most</td>
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</tbody>
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6. Water is more dense than alcohol or oil because its molecules can pack closely together, which means that it has more mass in the same volume than either alcohol or oil. In addition, oil is made up of carbon and hydrogen atoms while water is made up of oxygen and hydrogen atoms. Because water contains a heavier atom, we might expect it to be more dense than oil. Although alcohol also contains oxygen atoms, its molecules are not able to pack together as tightly as water molecules, and so it is less dense than water.

7. The carrot is more dense than water. It is less dense than saltwater.

8. Yes, adding salt made the water more dense. We know because after adding the salt, the carrot which had sunk, began to float.

9. If you placed equal volumes of water and saltwater on opposite ends of a balance, the saltwater would be heavier because it is more dense.
10. Adding salt to water increases the mass more than the volume, which makes the water more dense. This must be true. If it were the other way around, and adding salt increased the volume more than the mass, the water would actually have become less dense when the salt was added, and the carrot would have remained at the bottom of the cup.