Unit 6 Free Response Questions

Your class will select three questions from the following set that you must answer. Your answer to each question is worth a maximum of ten points each. Points are earned in the following ways:

3 pts: English writing conventions – the student writes complete sentences with proper punctuation and grammar. The question is restated in the context of the answer.

4 pts: The answer addresses the question that was asked. Required examples, explanations and illustrations are provided, though they might not be correct.

3 pts: The answer is conceptually correct.

1. Water has the unusual property of being denser as a liquid than as a solid. Explain the role that this difference plays in the weathering of rock on the surface of the Earth.

2. You take a 50 gram piece of iron at 120°C and place it in 50 grams of water that is initially at 20°C. In which direction does heat flow as the two reach an identical temperature? Why is the final temperature of the water and iron only slightly above 20°C?

3. It is a well-established fact that water molecules have strong attractions for one another. Name the type of bonding that occurs between water molecules. Draw a sketch of at least four water molecules, and show these intermolecular forces using dotted lines.

4. According to your periodic table, the energy required to melt one gram of ice at 0°C (the latent heat of fusion of water) is 334 joules per gram. The energy required to boil one gram of water at 100°C (the latent heat of vaporization of water) is 2260 joules per gram. Explain in terms of intermolecular attraction AND kinetic energy why it the heat of vaporization is nearly seven times the value of the heat of fusion.

5. Imagine that you are stranded in the wilderness in winter time. The only available water is snow, and you do not have a stove or fire with which to melt it. You decide to eat the snow to quench your thirst. Where is the energy coming from to melt the snow as you eat it? Why might consuming the snow actually DECREASE your long-term chances of survival?

6. Describe the role that the high heat capacity of water plays in the uneven heating of the Earth's surface. How does this contribute to wind patterns in California? Feel free to include a drawing as *part* of your answer.