Test Yourself: Conduction, Convection, and Radiation answer key

Choose _____ of the following situations and write your responses in your journal. Please use at least one of the three types of heat transfer in each response.

1. In the evening, snow falls on a cement sidewalk and on a black top playground. Which surface will melt the snow faster and why? (The playground because it is black and absorbs more heat; the cement is white and reflects the heat.)
2. Two identical cups of hot cocoa are sitting on a table. One has a metal spoon in it and one does not. After five minutes, which cup is cooler? (Since the spoon was cooler than the cocoa, some of the heat transferred out of the cup into the spoon, thus making that cocoa cooler.)
3. When a person steps from a shower on a cold morning, why does the tile floor seem so much colder than the air? (Your warm body directly touches the tile, so the warmth transfers to the floor and the floor feels cold.)
4. On a hot summer day, should you close all of the blinds and curtains in your home or leave them open? Why? (You should close the blinds. Because the windows are clear glass, the infrared will go right through it to warm your home. Opaque blinds and curtains will block the heat from coming inside.)
5. Although you do not touch the flames, your chest feels warm while you are sitting in front of a fireplace. Why does your back still feel cold? (The fire radiates heat on your chest. It does not go through your body to the other side.)
6. The outdoor temperature is 85°F, and your friend comes to school in a dark blue outfit. Was this a smart clothing choice for today? Why or why not? (No! She'll be hot because of the heat the dark color will absorb. Lighter colors reflect; pink or another light color would have been a better choice.)
7. Why is your house warmer on the top floor and colder in the basement? (Convection currents cause hot air to rise to the top floor, so the cold air stays below.)
8. Your mom bakes a cake in a glass pan and you use a metal pan. How does heat transfer affect each pan? (The metal conducts the heat and through conduction, cooks the brownies; conduction also cooks the brownies in the glass pan, but since infrared goes right through the glass, they also cook by radiation.)
9. Explain how the following situation occurs using conduction, convection, and radiation: A pot of water boils on a hot stove. (You can feel the radiation from the burner, the pot gets hot because of conducting the heat from the burner, and the water boils because of the convection currents which push the hottest water to the top.)
10. Explain how the following situation occurs using conduction, convection, and radiation: On a hot day, an ice cream cone in your hand falls on the sidewalk and immediately begins melting. (Radiation comes from the sun; conduction occurs when the hot sidewalk transfers heat to the ice cream, heat felt above the sidewalk is convection and aides in the melting process.)