Name: _____ **Date:** _____

Answer Key: Thermal Theories: Thinking Through 3rd Grade Thermodynamics

Moving beyond basic temperature reading, students evaluate complex heat transfer scenarios through logic-based analysis and synthesis of energy flow patterns.

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1. A wildlife researcher notices that a desert lizard sits on a dark, flat rock for 20 minutes every morning. Why is the lizard choosing this specific rock behavior?

Answer: B) To gain thermal energy quickly via conduction

Conduction is the transfer of heat through direct touch. Dark stones absorb more solar energy, which then moves into the lizard's body when they touch.

2. If you leave a hot cup of cocoa on the counter, the heat energy moves from the colder room air into the hot cocoa.

Answer: B) False

The Second Law of Thermodynamics dictates that heat energy always flows spontaneously from a warmer object to a cooler one.

3. An inventor is designing a winter coat. To stop heat from leaving the body, they should use a material called an _____.

Answer: C) Insulator

Insulators are materials that slow down or resist the transfer of heat, keeping the body's warmth trapped inside.

4. Imagine you have a sealed box of air. If you use a tool to compress (squeeze) that air very quickly, what will happen to the energy inside?

Answer: D) Doing work on the air increases its internal energy

According to the First Law of Thermodynamics, energy is conserved. Adding 'work' to a system by compressing it increases its internal thermal energy.

5. When a chef uses a wooden spoon instead of a metal spoon to stir boiling soup, they are preventing heat transfer by _____.

Answer: A) Conduction

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Wood is a poor conductor of heat compared to metal, making it safer to touch when stirring hot liquids.

6. Energy can be created by a very powerful heater as long as it has enough batteries.

Answer: B) False

The Law of Conservation of Energy states that energy cannot be created; the heater merely transforms electrical energy into thermal energy.

7. You place a tray of water in the freezer. As the water turns to ice, what is happening to the thermal energy of the water?

Answer: B) Thermal energy is leaving the water and moving into the freezer air

Freezing is the process of removing thermal energy from a liquid. The heat moves from the warmer water to the colder air in the freezer.

8. In a house with two floors, the upstairs usually feels warmer than the downstairs because of _____.

Answer: C) Convection

Convection is the movement of heat in gases or liquids where warm, less dense molecules rise and cool, denser molecules sink.

9. Entropy is a measure of how organized and orderly energy is in a system.

Answer: B) False

Entropy is actually a measure of disorder or randomness. High entropy means energy is spread out and less 'orderly'.

10. Scientists use the idea of 'Absolute Zero' to describe a state where molecules have almost no movement. This is related to the:

Answer: C) Third Law of Thermodynamics

The Third Law of Thermodynamics explains that as temperature reaches absolute zero, the disorder (entropy) reaches its lowest possible point.