Name: _____ **Date:** _____

Answer Key: Molten Lava and Frozen Tundra: 7th Grade Thermal Energy Quiz

Examine how thermal energy behaves in deep sea hydrothermal vents and spacecraft insulation through the lens of conduction and the laws of thermodynamics.

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1. When a blacksmith plunges a red-hot iron horseshoe into a bucket of cold water, in which direction does the thermal energy move?

Answer: B) From the hot horseshoe into the cold water

According to the Second Law of Thermodynamics, heat spontaneously flows from an object with a higher temperature to an object with a lower temperature.

2. True or False: Energy can be completely destroyed if a machine is not efficient enough.

Answer: B) False

The First Law of Thermodynamics (Law of Conservation of Energy) states that energy cannot be created or destroyed, only transformed from one form to another.

3. In a deep-sea hydrothermal vent, hot water rises while colder water sinks to take its place. This method of heat transfer is called _____.

Answer: C) Convection

Convection is the transfer of heat through the movement of fluids (liquids or gases) where warmer, less dense material rises.

4. Why do engineers use ceramic tiles on the bottom of a space shuttle entering the atmosphere?

Answer: B) To prevent heat from conducting into the shuttle's frame

Ceramics are poor conductors of heat, acting as insulators to protect the spacecraft from the intense heat of atmospheric re-entry.

5. The total amount of disorder or randomness in a system is known as _____.

Answer: A) Entropy

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Entropy is a measure of molecular disorder, and the Second Law of Thermodynamics states that entropy in an isolated system always increases.

6. True or False: Thermal radiation is the only form of heat transfer that can travel through the vacuum of empty space.

Answer: A) True

Unlike conduction and convection, which require matter (atoms or molecules) to move heat, radiation travels as electromagnetic waves.

7. If you hold a piece of chocolate in your hand and it begins to melt, which process is primarily responsible for the heat transfer?

Answer: C) Conduction

Conduction is the transfer of heat through direct contact between two objects, such as your warm skin and the solid chocolate.

8. Scientists use the Kelvin scale to measure temperature. The theoretical point where all molecular motion stops is called _____.

Answer: B) Absolute Zero

Absolute Zero (0 Kelvin) is the temperature at which the Third Law of Thermodynamics suggests entropy reaches its minimum and molecular motion ceases.

9. True or False: A 'heat sink' in a computer is designed to pull thermal energy away from the CPU to prevent overheating.

Answer: A) True

Heat sinks use materials with high thermal conductivity to move heat away from sensitive electronic components.

10. When you use an electric kettle to boil water, what is the primary energy transformation occurring according to the First Law of Thermodynamics?

Answer: B) Electrical energy transforms into thermal energy

The electrical energy from the outlet is converted into thermal energy by the heating element, illustrating energy transformation.