

Name: _____ Date: _____

Searing Science: Sparking Seventh Grade Heat Systems

Examine thermal energy transfer through 10 engineering scenarios that go beyond simple definitions to analyze particle motion and energy conservation.

1. A deep-sea diver notices that their thick neoprene suit keeps them warm by trapping a layer of water against their skin. Which heat transfer process is being minimized because the water is held still and cannot circulate?

- A. Radiation
- B. Convection
- C. Evaporation
- D. Sublimation

2. When a blacksmith hammers a piece of iron, the iron gets hot even though no fire is touching it. This is because _____ is being done on the system, increasing its internal energy.

- A. Entropy
- B. Conduction
- C. Work
- D. Radiation

3. According to the Second Law of Thermodynamics, it is possible for a machine to convert 100% of the thermal energy it receives into useful mechanical work without any 'waste' heat.

- A. True
- B. False

4. If you place a block of dry ice (-78°C) into a container of liquid nitrogen (-196°C), in which direction will the thermal energy move spontaneously?

- A. From the liquid nitrogen to the dry ice
- B. From the dry ice to the liquid nitrogen
- C. No energy will move because both are below freezing
- D. The energy will move back and forth in a perfect circle

5. Super-insulating materials used in spacecraft often feature shiny, reflective silver surfaces. These surfaces are specifically designed to block heat transfer by _____.

- A. Conduction
- B. Convection
- C. Radiation
- D. Advection

6. Absolute Zero is the theoretical temperature at which all molecular motion stops and the entropy of a perfect crystal reaches its minimum value.

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- A. True
- B. False

7. Imagine an isolated system where a hot copper rod is placed next to a cold copper rod. Over time, the energy spreads out evenly. This increase in the 'disorder' or 'spreading out' of energy is known as:

- A. Enthalpy
- B. Efficiency
- C. Equilibrium
- D. Entropy

8. A laptop gets hot because the electrical components are transferring energy to the surroundings. This is an example of the First Law of Thermodynamics because the energy is not disappearing, but _____ into heat.

- A. Transformed
- B. Created
- C. Destroyed
- D. Condensed

9. A thick ceramic mug is a better insulator than a thin copper cup because ceramic has lower thermal conductivity, slowing the rate of conduction.

- A. True
- B. False

10. Which of these is a real-world application of the Third Law of Thermodynamics in modern science?

- A. Designing faster jet engines
- B. Cryogenics and the study of superconductors
- C. Predicting the weather using air currents
- D. Building more efficient solar panels