**Name:** _____ **Date:** _____

## Wrangle Thermal Chaos: High-Stakes Physics for 6th Grade

Students analyze molecular collisions and predict energy outcomes in complex engineering and natural scenarios to solve entropy-driven puzzles.

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**1. A deep-sea hydrothermal vent releases superheated water into the frigid ocean. Why doesn't the entire ocean immediately reach a uniform temperature?**

A. Water is a perfect insulator and prevents all heat movement.
B. Thermal equilibrium takes time as energy must transfer through massive volumes of water.
C. The First Law of Thermodynamics forbids heat from moving in salt water.
D. Cold water has zero internal energy and cannot absorb heat.

**2. In a closed system, if you add 400 J of heat and the system performs 150 J of work, the internal energy of the system increases by _____ Joules.**

A. 550
B. 150
C. 250
D. 400

**3. The Second Law of Thermodynamics suggests that in an isolated system, energy will naturally spread out and become less organized over time.**

A. True
B. False

**4. Engineers designing a spacecraft use ceramic tiles because they have low thermal conductivity. Which process are they primarily trying to inhibit during atmospheric reentry?**

A. Radiation
B. Convection
C. Conduction
D. Sublimation

**5. A substance at 0 Kelvin would have its constituent particles moving at their maximum possible velocity.**

A. True
B. False

**6. A thermos maintains the temperature of a liquid by using a vacuum seal. A vacuum prevents heat transfer via conduction and _____ because there is no matter to carry the energy.**

A. Radiation
B. Convection
C. Insulation

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D. Entropy

**7. If you place a block of room-temperature iron into a bucket of boiling water, what must happen according to the Second Law of Thermodynamics?**

A. The iron will transfer cold energy to the water.
B. Thermal energy will flow from the water to the iron until they reach the same temperature.
C. The internal energy of the iron will decrease as it absorbs heat.
D. The entropy of the iron will decrease significantly while the water heats up.

**8. The total sum of all kinetic and potential energy of the particles inside an object is known as _____ energy.**

A. Thermal
B. Internal
C. Radiant
D. Absolute

**9. Energy can be destroyed if a system is 100% efficient.**

A. True
B. False

**10. Why does a piece of asphalt feel much hotter than a blade of grass on a sunny day, even though they receive the same solar radiation?**

A. The grass reflects all radiation while asphalt absorbs it.
B. Asphalt has a different specific heat capacity and lacks the cooling biological processes of grass.
C. The Second Law of Thermodynamics only applies to man-made objects like asphalt.
D. Asphalt creates matter to increase its temperature.