Name: _____ **Date:** _____

Nail Thermodynamics with 6th Grade Physics

Calculate thermal equilibrium and bridge energy conservation laws as you solve real-world challenges in heat transfer and entropy systems.

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1. A deep-sea volcanic vent releases superheated water into the cold ocean floor. Which process primarily moves this thermal energy upward through the liquid water column?

A. Solid-state conduction
B. Electromagnetic radiation
C. Fluid convection currents
D. Thermal insulation

2. Imagine you are holding a cold iron rod and a wooden stick. The iron rod feels colder because it has a higher _____, meaning it moves heat away from your hand faster.

A. Specific heat capacity
B. Thermal conductivity
C. Insulation rating
D. Internal friction

3. According to the Second Law of Thermodynamics, a closed system will naturally move toward a state of higher disorder, known as entropy.

A. True
B. False

4. A scientist places a 50°C copper block in a bucket of 20°C water. After one hour, both are 28°C. What state have the water and copper reached?

A. Absolute zero
B. Thermal equilibrium
C. Latent heat fusion
D. Adiabatic expansion

5. Energy can be completely destroyed if a machine is 100% efficient.

A. True
B. False

6. In a steam engine, high-pressure steam pushes a piston. The work done by the piston and the heat lost to the surroundings must equal the _____ energy originally in the steam.

A. Kinetic
B. Total internal
C. Electrical
D. Potential

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7. Which of these scenarios best demonstrates the Third Law of Thermodynamics regarding the behavior of particles?

A. Liquid nitrogen freezing a flower instantly
B. Particles reaching minimum motion near 0 Kelvin
C. Water boiling into steam at high altitudes
D. A car radiator cooling the engine

8. A vacuum flask (Thermos) prevents heat loss by having a space with no air between two glass walls. This specifically blocks heat transfer via conduction and _____.

A. Convection
B. Radiation
C. Friction
D. Induction

9. In space, a satellite stays warm because it absorbs thermal energy from the Sun through radiation, even though there is no air.

A. True
B. False

10. If you add 200 Joules of heat to a system and the system performs 150 Joules of work on its surroundings, what is the net change in internal energy?

A. 350 Joules increased
B. 50 Joules decreased
C. 50 Joules increased
D. 0 Joules change