

Heat and Temperature Quiz Answer Key PDF

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Describe how the second law of thermodynamics applies to heat engines.

The second law states that heat engines cannot convert all absorbed heat into work; some energy is always lost as waste heat, increasing entropy.

What is the significance of the latent heat of vaporization in phase changes?

The latent heat of vaporization is the energy required to change a liquid into a gas without changing its temperature, crucial for processes like boiling and evaporation.

How does thermal expansion affect the design of bridges?

Engineers must account for thermal expansion to prevent structural damage by allowing for expansion and contraction due to temperature changes.

Why is water's high specific heat capacity important for climate regulation?

Water's high specific heat capacity allows it to absorb and release large amounts of heat with minimal temperature change, moderating Earth's climate.

Describe an experiment to measure the specific heat capacity of a metal.

Heat a known mass of metal to a specific temperature, then submerge it in water of known mass and temperature. Measure the temperature change of the water to calculate the metal's specific heat capacity using the heat transfer equation.

Which factors affect the rate of heat transfer by conduction? (Select all that apply)

A. Temperature difference ✓

B. Surface area ✓

C. Material thickness ✓

D. Color of the material

Which temperature scale is based on the absolute zero point?

A. Celsius

B. Fahrenheit

C. Kelvin ✓

D. Rankine

Which of the following are methods of heat transfer? (Select all that apply)

A. Conduction ✓

B. Convection ✓

C. Radiation ✓

D. Evaporation

What does temperature measure in a substance?

A. Total energy

B. Average kinetic energy of particles ✓

C. Potential energy

D. Chemical energy

Which of the following is a measure of heat energy required to change the temperature of a substance?

A. Thermal conductivity

B. Specific heat capacity ✓

C. Thermal expansion

D. Heat flux

What is the process called when a liquid turns into a gas?

A. Freezing

B. Condensation

C. Vaporization ✓

D. Sublimation

Which method of heat transfer involves the movement of fluids?

- A. Conduction
- B. Convection ✓**
- C. Radiation
- D. Insulation

Which law of thermodynamics states that energy cannot be created or destroyed?

- A. Zeroth Law
- B. First Law ✓**
- C. Second Law
- D. Third Law

What happens to a metal rod when it is heated?

- A. It contracts
- B. It expands ✓**
- C. It remains the same
- D. It melts

Which of the following are examples of phase changes? (Select all that apply)

- A. Melting ✓**
- B. Boiling ✓**
- C. Freezing ✓**
- D. Sublimation ✓**

Explain the difference between heat and temperature.

Heat is the energy transferred between objects due to a temperature difference, while temperature is a measure of the average kinetic energy of particles in a substance.

Which statements are true about thermal equilibrium? (Select all that apply)

- A. It occurs when two objects reach the same temperature. ✓**
- B. Heat continues to flow between objects.
- C. No net heat flow occurs between objects. ✓**
- D. It can only occur in solids.

Which of the following are units of temperature? (Select all that apply)

- A. Celsius ✓**
- B. Kelvin ✓**
- C. Joule
- D. Fahrenheit ✓**

What is the primary unit of measurement for heat in the International System of Units (SI)?

- A. Calorie
- B. Joule ✓**
- C. Fahrenheit
- D. Kelvin

Which of the following statements about specific heat capacity are correct? (Select all that apply)

- A. It is the same for all substances.
- B. It determines how much heat is needed to change the temperature of a substance. ✓**
- C. Water has a high specific heat capacity. ✓**
- D. It is measured in Joules per kilogram per degree Celsius. ✓**