

Learning Target: I can explain the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).

Heat Transfer & Molecular Motion Activity

Objective: Explain the effects of heat transfer on molecular motion as it relates to the collision of atoms (conduction), through space (radiation), or in currents in a liquid or a gas (convection).

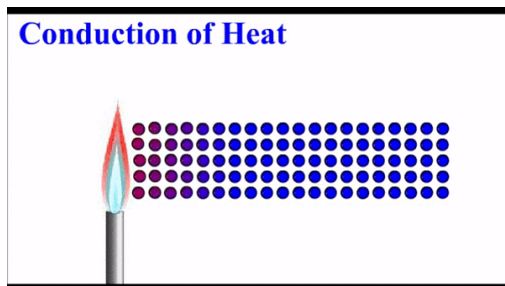
Part 1: Heat Transfer Mechanisms



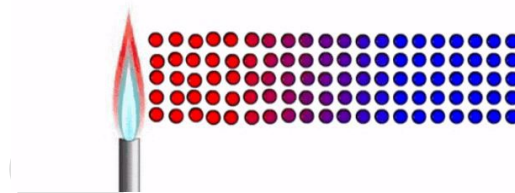
A. Conduction

- Heat transfer through direct contact of particles.
- Molecules in the hotter part of the object vibrate faster and transfer energy to adjacent molecules.

Diagram: Molecular Motion in Conduction



Conduction of Heat



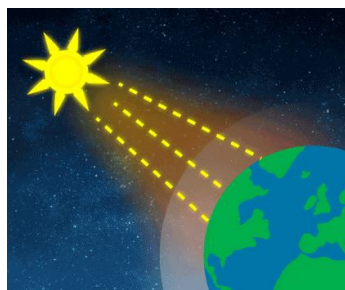
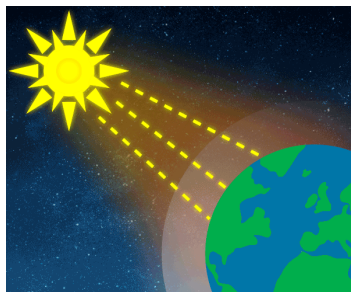
Question 1: What happens to the motion of molecules when heat is transferred through conduction? ____

Question 2: Give one example of conduction in daily life. _____

B. Radiation

- Heat transfer through electromagnetic waves.
- No medium is required; heat can travel through space.

Diagram: Heat Transfer by Radiation



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Question 3: How does radiation differ from conduction in terms of molecular interaction? _____

Question 4: Why do darker-colored surfaces absorb more heat than lighter-colored surfaces? _____

C. Convection

- Heat transfer through the movement of fluids (liquids or gases).
- Warmer, less dense fluid rises, while cooler, denser fluid sinks, creating a convection current.

Diagram: Convection Currents in a Liquid



Question 5: Describe how convection currents help transfer heat in the atmosphere. _____

Question 6: Why does warm air rise and cool air sink? _____

Part 2: Comparing Heat Transfer Methods Chart - Characteristics of Heat Transfer Methods

Method	Medium Required?	Molecular Motion?	Example
Conduction			
Radiation			
Convection			

Question 7: Use the chart to explain which method of heat transfer does not require matter to occur. _____

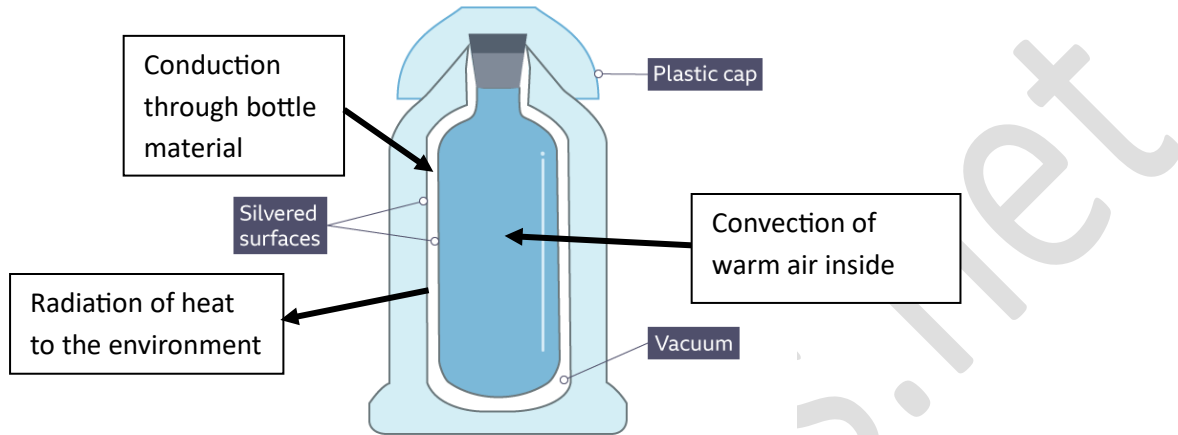
Question 8: Complete the chart by adding one more example for each heat transfer method. _____

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Part 3: Application and Analysis

Scenario: You are designing a new insulated water bottle. To prevent heat loss, you must consider all three forms of heat transfer.

Diagram: Heat Loss in an Insulated Bottle (Include a diagram showing conduction through the bottle material, convection of warm air inside, and radiation of heat to the environment.)



Question 9: How would you minimize heat loss by conduction in your design? _____

Question 10: What material properties would reduce radiation from the bottle surface? _____
