

THE STANDARD

Thermal Energy Transfer

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

DCI

DISCIPLINARY
CORE IDEA

PS3.A · Definitions of Energy

Temperature is a measure of the average kinetic energy of particles of matter.

Thermal energy moves from hot to cold on its own. Always. A warm cup of coffee gives up its heat to the cool room. An ice cube pulls heat in from the air around it. **The standard pairs that core idea with engineering: students design a device that either slows that flow down (an insulated cup) or speeds it up (a solar cooker), then test and rebuild it.**

SEP

SCIENCE &
ENGINEERING
PRACTICE

Constructing Explanations and Designing Solutions

Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system.

Students aren't running a one-shot experiment. They're designing a device against criteria and constraints, testing it with a thermometer, reading the data, and changing one variable to make the next version better. **Their notebook should show a v1, a test, a decision, and a v2.**

CCC

CROSSCUTTING
CONCEPT

Energy and Matter

The transfer of energy can be tracked as energy flows through a designed or natural system.

Energy doesn't disappear when something cools off. It flows. Out of the hot water, through the cup walls, into the room air. Students track that flow with a thermometer. **The temperature reading over time IS the energy story, and a good design either blocks the flow or opens a faster path for it.**