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# Thermodynamics: Temperature Scales

**Objective:** To learn about the Celsius, Fahrenheit, and Kelvin temperature scales, understand their historical origins, compare their key reference points, and learn to convert temperatures between these scales.

## I. Historical Origins of Temperature Scales

**Celsius** (°C): Developed by Anders Celsius in 1742, originally setting the boiling point of water at 0°C and freezing at 100°C, later reversed.

**Fahrenheit** (°F): Created by Daniel Gabriel Fahrenheit in 1724, using brine as a reference point, setting the freezing point of water at 32°F and boiling point at 212°F.

**Kelvin** (K): Proposed by Lord Kelvin (William Thomson) in 1848, based on the concept of absolute zero, the theoretical point where particles have minimum thermal motion.

## II. Comparison Table: Freezing and Boiling Points of Water

| Temperature Scale | Freezing Point of Water | Boiling Point of Water |
| --- | --- | --- |
| Celsius (°C) | 0°C | 100°C |
| Fahrenheit (°F) | 32°F | 212°F |
| Kelvin (K) | 273.15 K | 373.15 K |

## III. Converting Between Temperature Scales

Celsius to Fahrenheit: $°F = (°C × 9/5) + 32$
Fahrenheit to Celsius: $°C = (°F - 32) × 5/9$
Celsius to Kelvin: $K = °C + 273.15$
Kelvin to Celsius: $°C = K - 273.15$

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**IV. In-Class Problem for Discussion:**

**Problem 1:**
The baking instructions for your cake says, bake at 350 F. But your European oven only has markings in Celsius. What temperature should you pick?

**Problem 2:**
If deep space has a temperature of 2.7K, what is it in C?

**Problem 3:**
A scientist forgot to record a temperature. They claim it's the same in Celsius and Fahrenheit. What could this temperature be?