



## Temperature (AIR)

### *What is Temperature?*

Temperature is the physical quantity that expresses hot and cold. It is a measure of the average kinetic energy of the atoms or molecules in a system. For example, the water molecules in a cup of hot coffee have a higher average kinetic energy, and therefore a higher velocity, than the water molecules in a cup of iced tea. The temperature at which a substance melts is an intensive property of the substance; it is not dependent on the mass of the substance. Temperature and heat are not the same. Heat is the flow of thermal energy (the energy that is responsible for the temperature in a system).

### *Why do we measure Temperature? What is the significance of studying Temperature?*

All matter contains thermal energy that can flow from one body to another if a temperature difference is present. Temperature is measured with a thermometer calibrated using reference points such as freezing or boiling. Accurate, reliable temperature measurement is important in all fields of science and engineering as well as everyday life. Temperature sensors are used every day for regulating water temperature, controlling refrigeration systems, monitoring building temperatures, assessing patient vitals, and more.

### *How does a Temperature sensor work?*

Temperature is measured via a digital temperature sensor with a semiconductor based integrated circuit that will change its electrical properties in response to a change in temperature.

### *What data is collected? Units of measure?*

The most common scales are the Celsius scale ( $^{\circ}\text{C}$ ), the Fahrenheit scale ( $^{\circ}\text{F}$ ), and the Kelvin scale (K), which is typically used for scientific purposes.

The lowest theoretical temperature is absolute zero on the Kelvin scale.

### Resources

[Global Temperature | Vital Signs – Climate Change: Vital Signs of the Planet \(nasa.gov\)](#)

[Climate Change: Global Temperature | NOAA Climate.gov](#)

[Temperature | US EPA](#)

[Track active weather with NOAA's new radar viewer | National Oceanic and Atmospheric Administration](#)

### Extension Activities

#### **Thermocouple**

### Glossary

[Heat](#) (noun): a form of energy that causes substances to rise in temperature or to go through associated changes (as melting, evaporation, or expansion)

[Kinetic energy](#) (noun): energy associated with motion





[Semiconductor](#) (noun): any of a class of solids (as germanium) that have an ability to conduct electricity between that of a conductor and that of an insulator

