

Thermodynamics

Usually I have you start with electricity (dryer room)

We're going to start with Thermodynamics instead.

⇒ Good inductive/deductive skills development.

Thermodynamics – study of Temperature, Internal Energy, Energy Transfer, State Change ⇒ Laws of Thermodynamics

As usual, the fun stuff to study is how quantities **change**.

- In mechanics → could see the changes (position, velocity, etc.)
- In thermo. → can't see most changes (1 exception – Vol. of gas)
 - ⇒ need to measure quantities **indirectly**.
 - Thermometers
 - Pressure sensors
 - ⇒ or calculate quantities **indirectly**.
 - Internal Energy
 - Energy Transfer (Work, Heat)

Unit 16.1

Today – Look at:

- Temperature
 - Temperature scales
 - How to measure temperature
 - Factors that affect accurate temperature measurements
- ⇒ Qualitative look at factors involved in temperature changes.

Unit 16.2

Just need a simple definition of how a glass bulb thermometer works.

Unit 16.3

There are 4 temperature scales in common use.

- Celsius, Fahrenheit \Rightarrow Relative Scales
- Kelvin, Rankine \Rightarrow Absolute Scales

Units for temperature are **degrees + scale used**.

- 1 exception: **Kelvin** \rightarrow no degrees, just the scale.

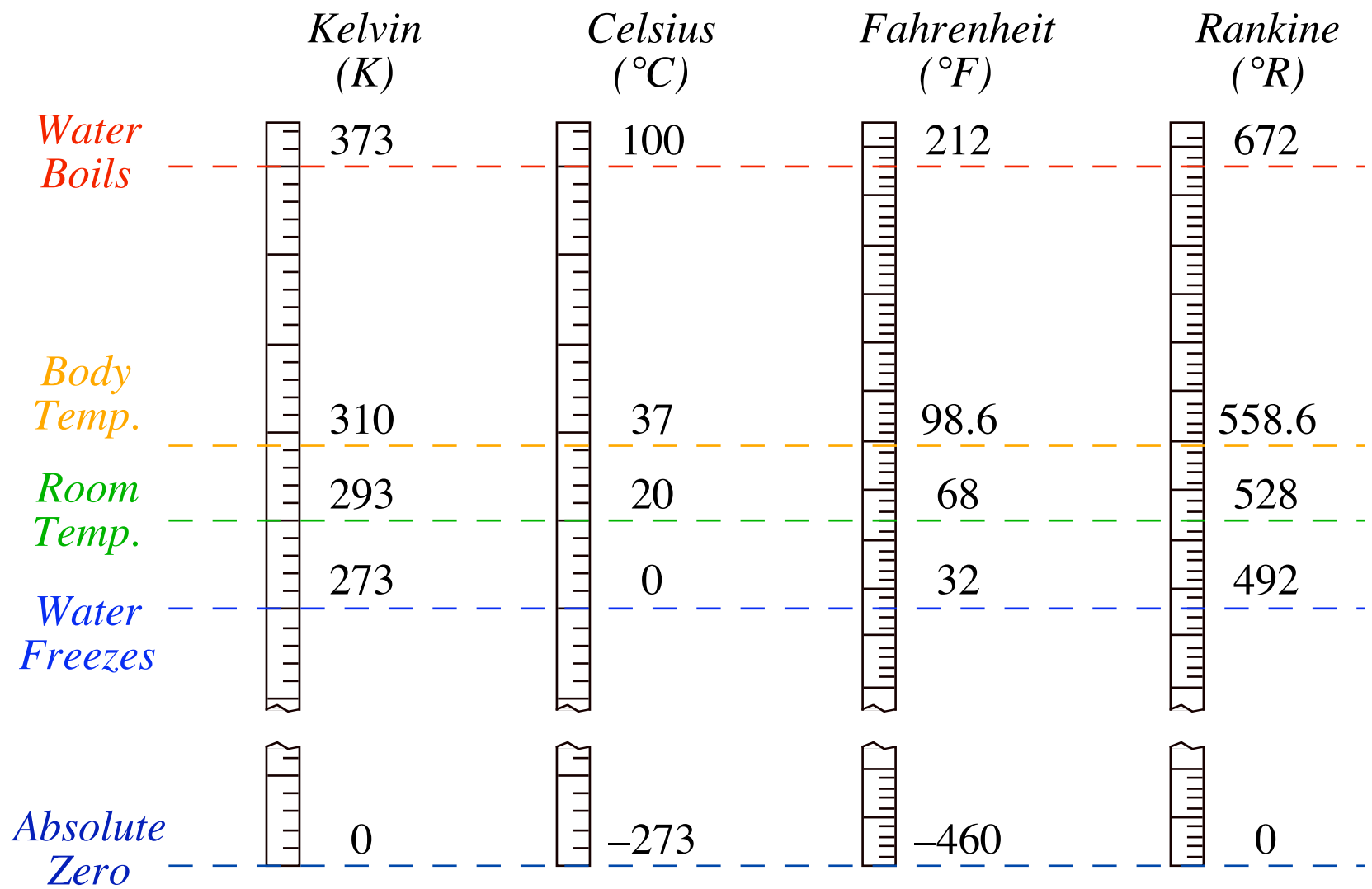
Defining a temperature scale is somewhat **arbitrary**, but the fixed points must be **repeatable**.

- You will define and create your own temperature scale.

Conversions between scales:

- °F & °C are **relative** scales – slope and constant term.
- Be careful to include **units** of slope and constant term.

$$T_F = \left(1.8 \frac{^\circ\text{F}}{^\circ\text{C}}\right) T_C + 32^\circ\text{F} \qquad T_C = \left(1 \frac{^\circ\text{C}}{\text{K}}\right) T_K - 273^\circ\text{C}$$



Only the United States, Liberia, and Burma still primarily use English units – the rest of the world is metric.



Unit 16.4, 16.5

We want the most accurate temperature measurements we can get.

- Good calibration of an electronic temperature sensor.
- Look at factors that affect temperature measurements.