**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 ⇒ Relative Scales
- Kelvin, Rankine ⇒ Absolute Scales

Units for temperature are degrees + scale used.

- 1 exception: Kelvin → 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.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0°F (-273°C)</td>
<td>212°F (373 K)</td>
<td>98.6°F (310 K)</td>
<td>68°F (293 K)</td>
<td>32°F (273 K)</td>
<td>0°F (-459.6 K)</td>
</tr>
<tr>
<td>-460°F (-273°C)</td>
<td>373°F (373 K)</td>
<td>200°F (37 K)</td>
<td>68°F (293 K)</td>
<td>0°F (273 K)</td>
<td>-460°F (-273°C)</td>
</tr>
</tbody>
</table>
Most of the world is metric and uses the Celsius temperature scale.
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.