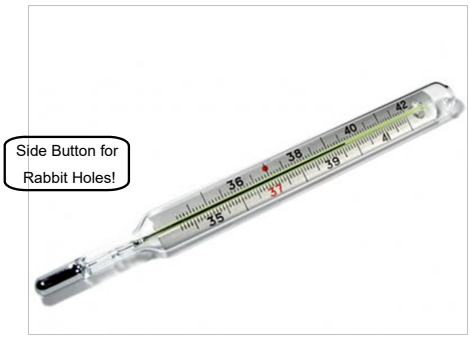
2.A.1 Temperature and Heat



1. Nerd Question!

What is the SI temperature scale, and how does it differ from other commonly used temperature systems?

Answer: the Kelvin scale. It is an absolute scale, meaning that it starts at zero and only has positive values.

Temperature vs. Heat

Temperature: Relative measure of hotness orcoldness.

Heat: Net energy transferred from one object toanother.

Molecular Dynamics and Heat

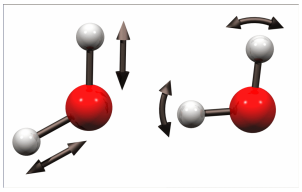
Temperature is associated with molecular motion's a measure of average kinetic energy of particles (atoms and molecules).

What's kinetic energy?
Who remembers the equation?

$$E = \frac{1}{2}mv^2$$

Kinetic Energy of Molecules

1. Translational Motion – movement of molecules through space.
2. Vibrational Motion – atoms in molecules move as far as chemical bonds allow.
3. Rotational Motion – molecules spin around.



Heat Movement

Thermal contact – when heat is transferred between objects, whether they're touching or not.

Thermal equilibrium – when objects in a system are at the same temperature.

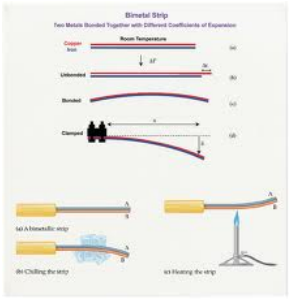
Temperature Scales

Thermometer – device that uses the physical properties of a substance (usually thermal expansion) to measure temperature.

Bimetallic Strip Demo:

A bimetallic strip is made of two different metals with different expansion properties.

They are often used in temperature gauges.



2. Flip the Coin Style Physics Democracy!

Which way will the bimetallic strip deflect when heated? I will hold it so that the numbered side is upwards.

Up	Down	Stays the Same

Liquid Expansion Thermometer

Expanding liquids are also commonly used in thermometers.

Here's one that uses alcohol.
Who can heat their thermometer more?

It's a hot-off!

Mercury used to be used commonly, but is nolonger.
Why do you think that is?

Fahrenheit – Celsius – Kelvin Conversions

Three different temperature scales arecommonly used, and converting from one to the other is necessary.

ºC → ºF : $^\circ F = 1.8\left(^\circ C\right) + 32$

ºF → ºC : $^\circ C = \dfrac{\left(^\circ F - 32\right)}{1.8}$

K → ºC: $^\circ C = K - 273$

ºC → K : $K = ^\circ C + 273$

Homework

Preview 2.A.2

2.A.1 Problems in your Booklet
Due: Next Class.