



The Heat is ON



The Heat is ON

What is Heat?

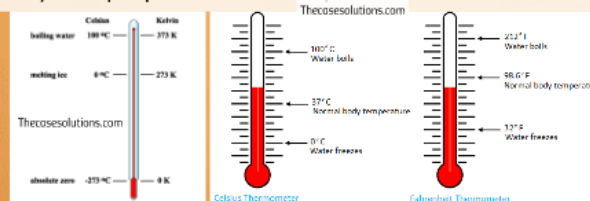
Heat is a form of Kinetic energy, that gives the sensation of hot or cold. It is measured in three Temperature scales. Celsius - based on the freezing (0°) and boiling point (100°) of water, at sea level. Fahrenheit - based on the normal body temperature (37°C - 100°F) of humans.

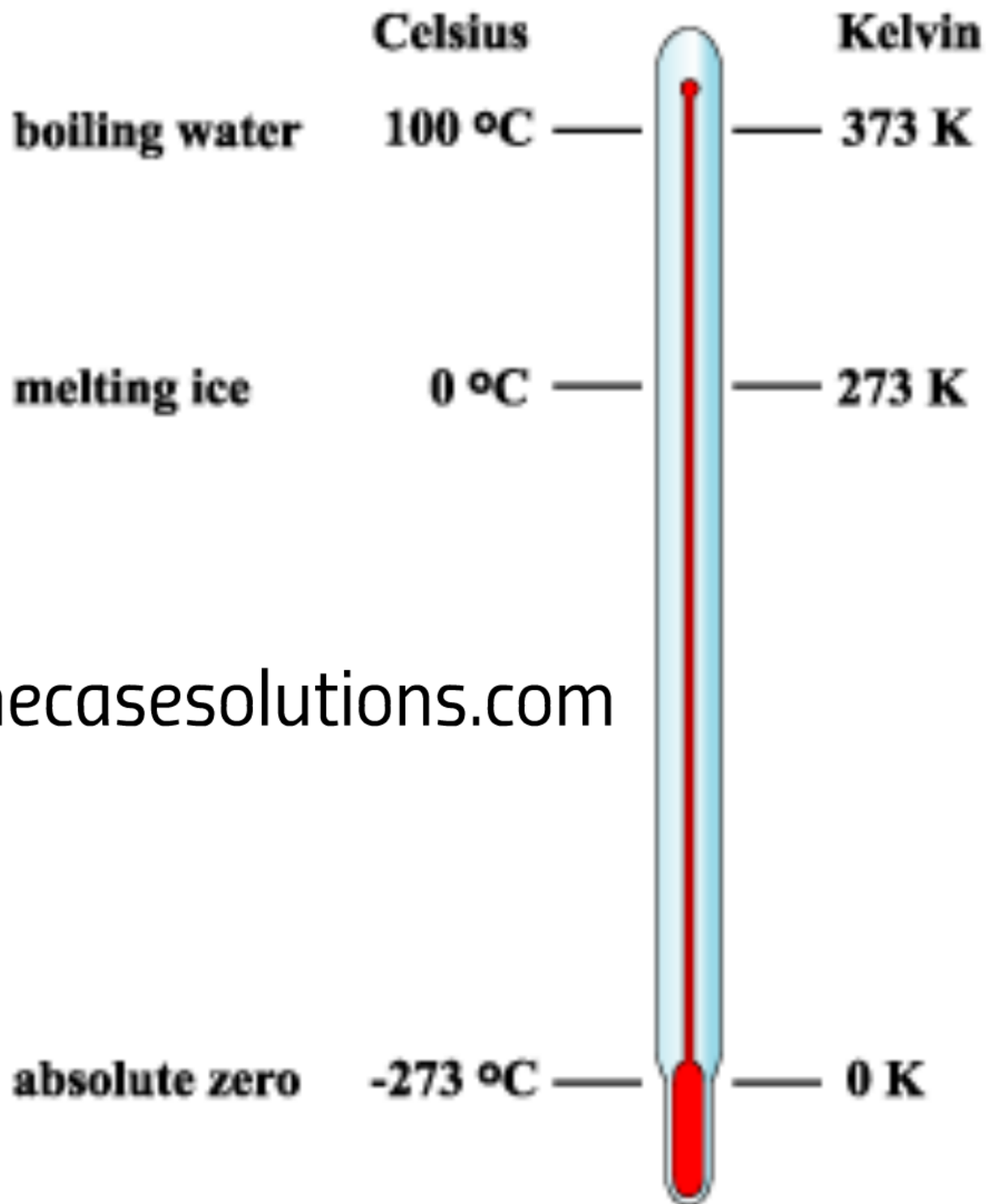
Kelvin - based on the Celsius scale but instead starts at -273.15°C , which is 0°K or Absolute zero.

There is a ratio of $1.8^{\circ}\text{F} : 1^{\circ}\text{C}$, but instead of starting at zero, they meet at -40 ($-40^{\circ}\text{C} = -40^{\circ}\text{F}$).

Humans can feel hot or cold due to nerve receptors in our skin, which can detect the difference between the temperature of the skin compared to our internal body temperature. A decrease in skin temperature relative to body temperature gives the sensation of cold, which is basically a lack of heat. An increase in skin temperature relative to body temperature gives the feeling of hot, or if slightly less, warm. However if the heat is transferred through the skin into the body, and the body temperature increases by even 2°C or 3°C , it can be extremely dangerous. It is known as Hyperthermia and can result in organ failure, unconsciousness and even death. If heat escapes the body through the skin, and body temperature decreases by even 2°C or 3°C , it can also be dangerous. This is called Hypothermia and can equate to shivering and confusion. Shivering is performed, naturally, to stimulate the molecules in the body to produce heat. If this does not work and the body continues to get colder, shivering stops and victims may go through something called paradoxical undressing, where a person becomes confused and removes their clothing increasing heat loss. Eventually, if nothing is done to warm the person up, Death follows.

Heat plays a very important role in body function so maintaining heat in living areas is a very significant discovery and proper insulation of the home is vital.

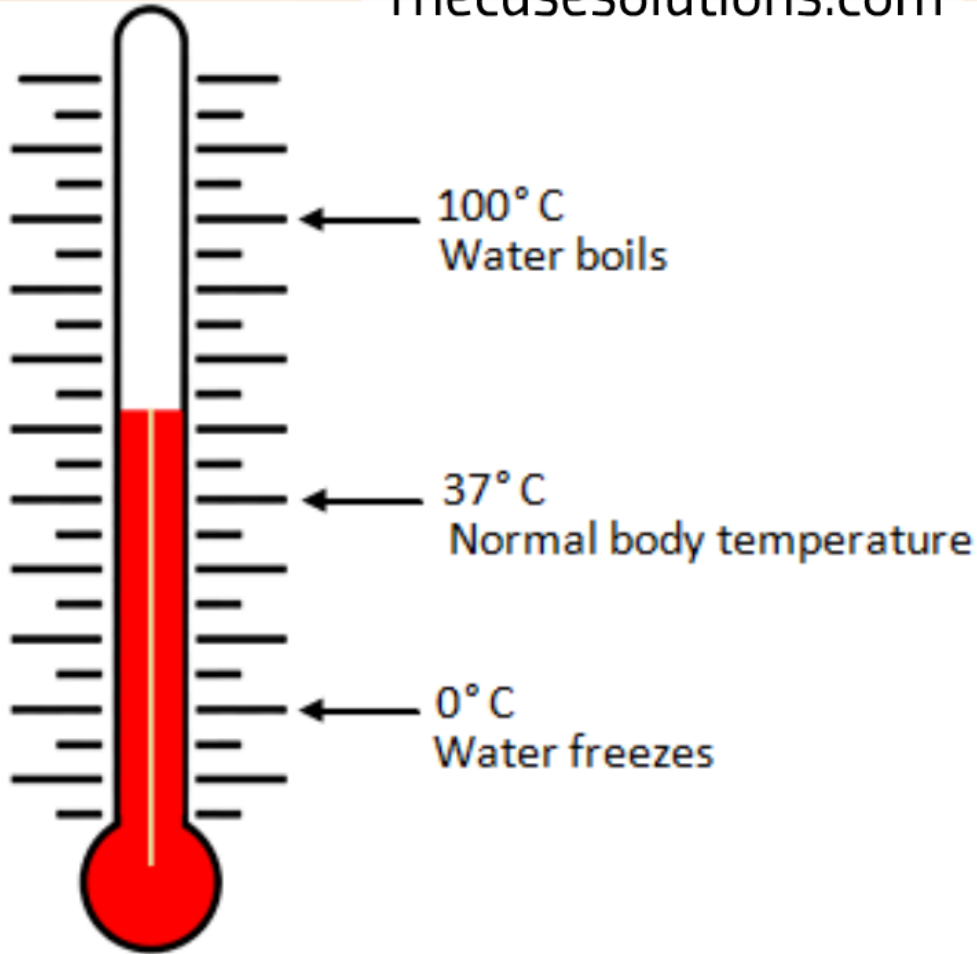




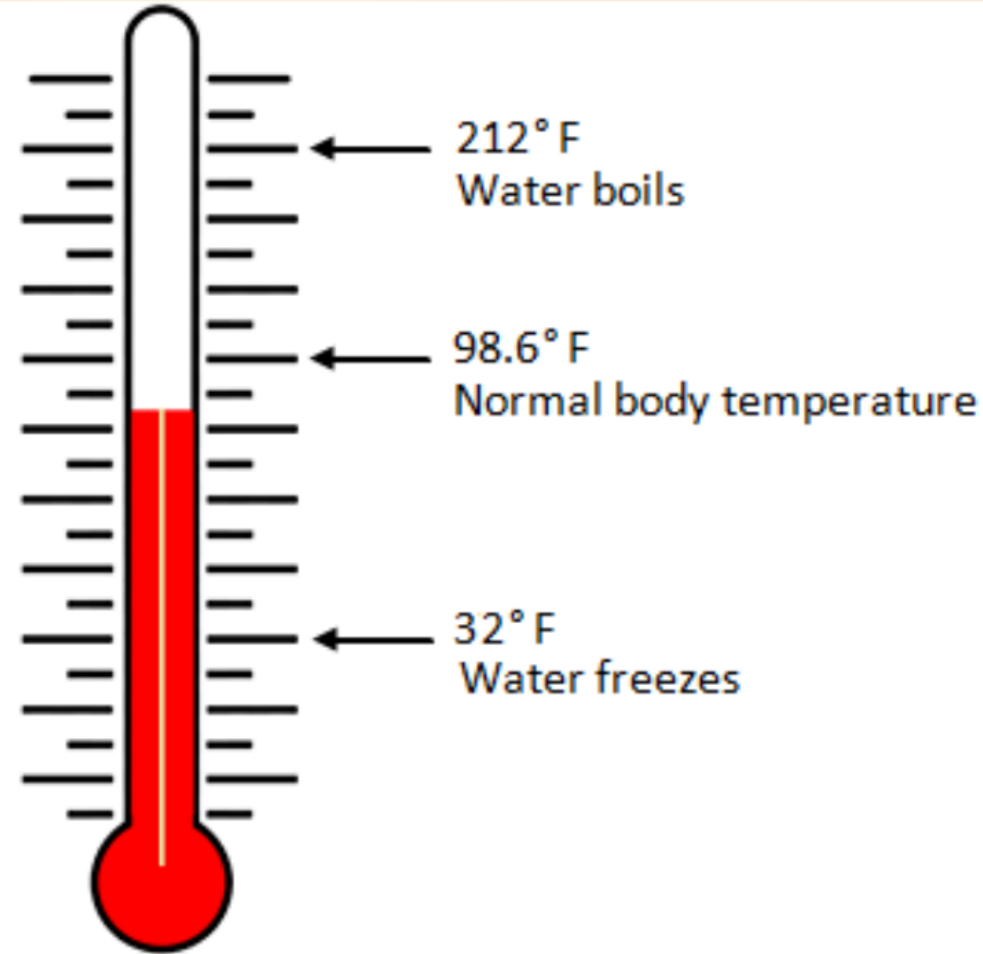
Thecasesolutions.com

Insulation of the home is vital.

Thecasesolutions.com



Celsius Thermometer



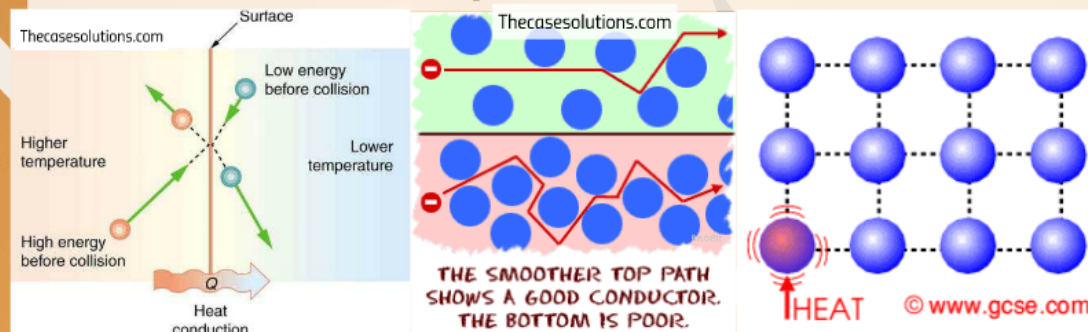
Fahrenheit Thermometer

Thecasesolutions.com

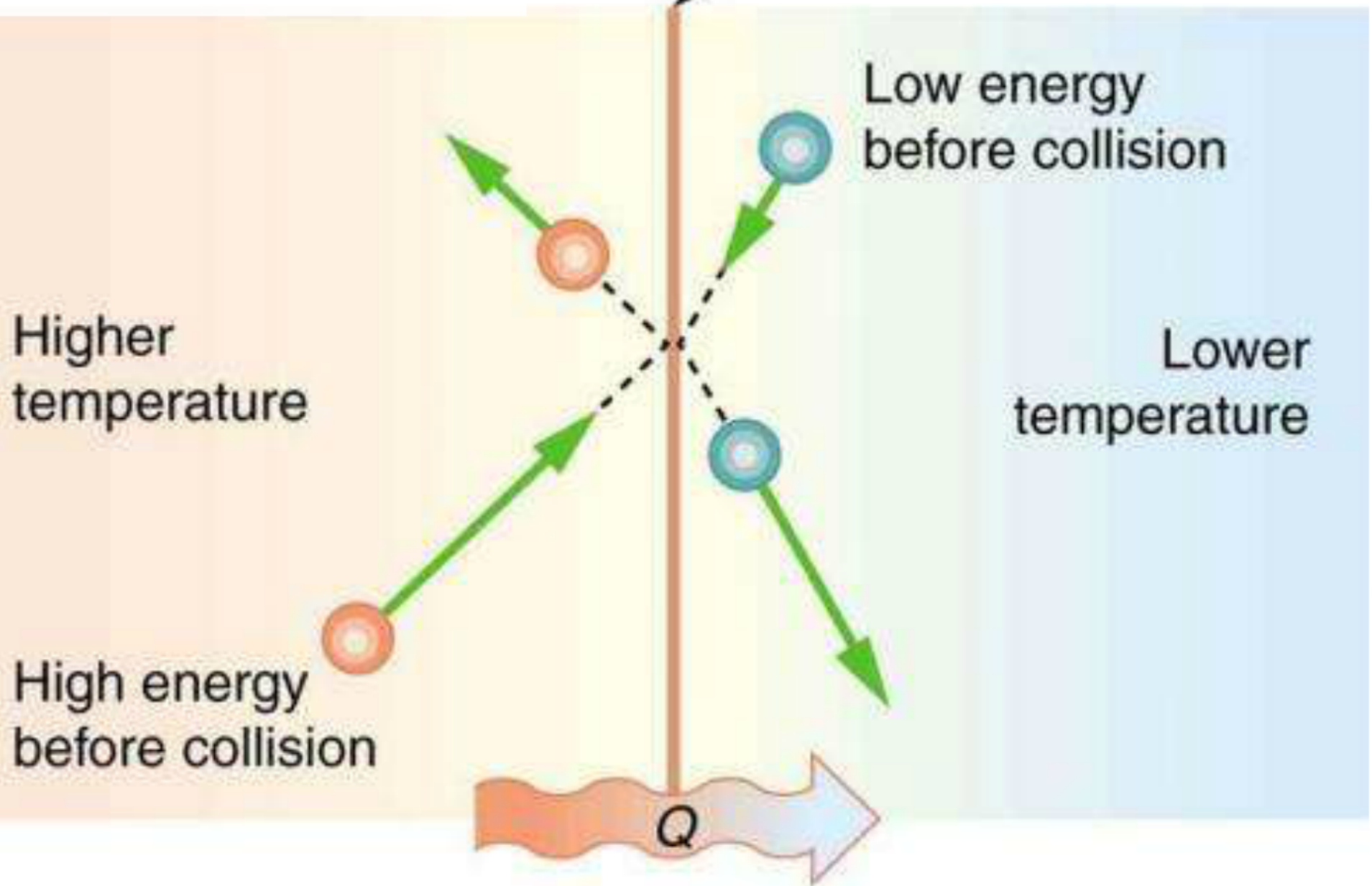
Conduction

One of the ways, heat is transferred through a principle known as Thermal Conduction. Discovered by Joseph Fourier who devised a formula that states, "that the time rate of heat transfer through a material is proportional to the negative gradient in the temperature and to the area, at right angles to that gradient, through which the heat flows". Basically saying, that whether or not something is a good conductor is determined by the rate at which heat is lost from the area surrounding the object, in proportion to the area at a right angle to the original area. This means the heat output is less than the heat input. However this only occurs in solids as the molecules do not have little to no intermolecular bonds in liquids and gases, respectively

Conduction is due to the heat, giving its energy to first molecule, causing it to vibrate more. The vibrating molecule hits the next molecule along the intermolecular bonds and passes on some of its energy to it. This continues until the heat has either passed completely through it or it has lost all of its energy. Something that doesn't conduct heat is called an insulator. In good conductors, the molecules are close together, due to the strength of the bonds and easily pass on the energy once they start to vibrate. In poor conductors, the molecules are either too far away to hit one another or the path from one end to the other is too complex or too dense (containing too many molecules), that the energy is used up before it reaches the end.



Surface



Low energy before collision

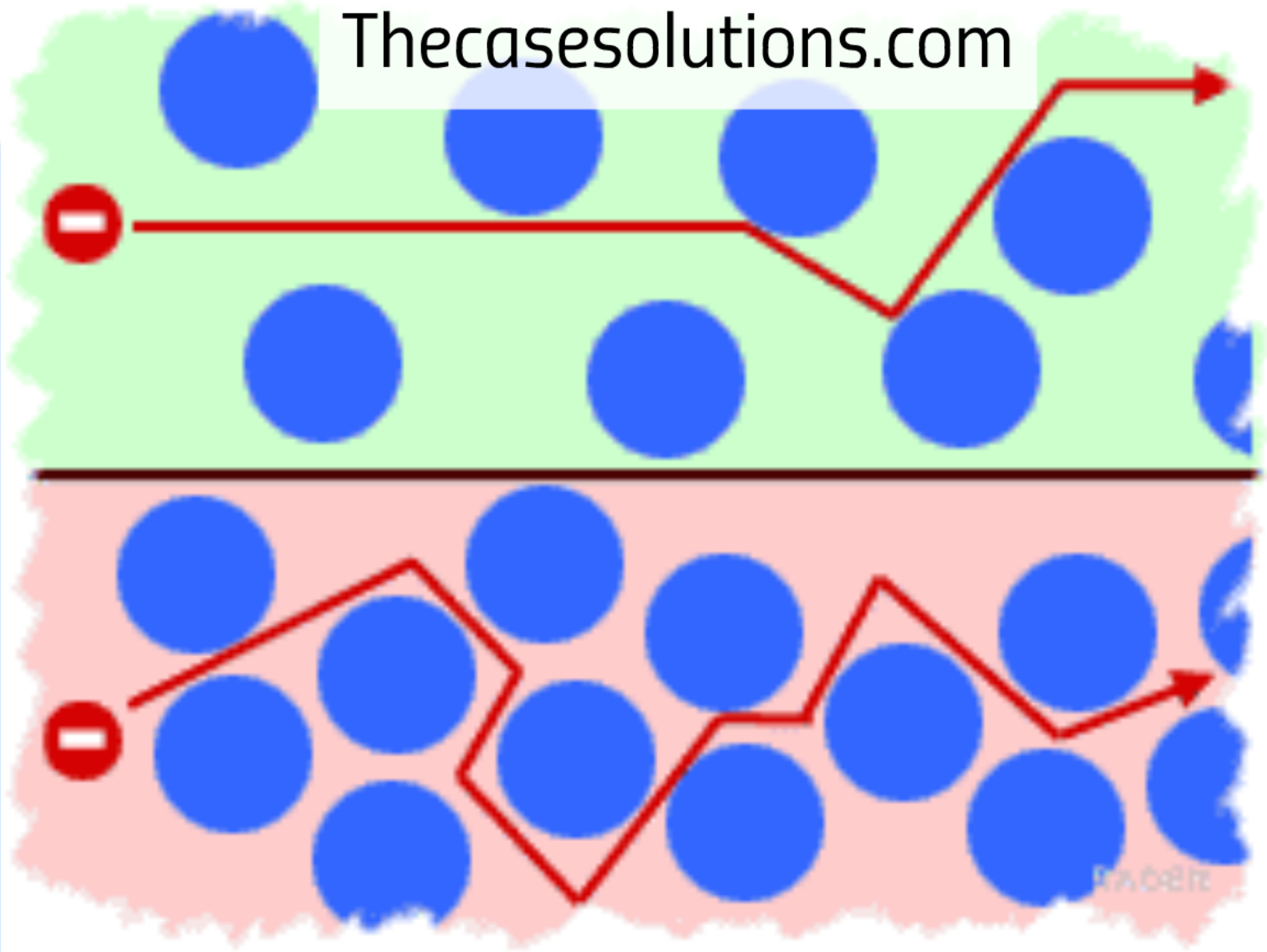
Higher temperature

Lower temperature

High energy before collision

Heat conduction

on
Lower
temperature



THE SMOOTHER TOP PATH
SHOWS A GOOD CONDUCTOR.
THE BOTTOM IS POOR.

Convection

This method of heat transfer, centers around the concept of heat rising. This long accepted phenomenon was confirmed after physicists began to elaborate on Newton's law of cooling, which says "the rate of heat loss of a body is proportional to the difference in temperatures between the body and its surroundings while under the effects of a breeze." They discovered that the temperature of the air above a heated area was warm as well. They saw the heat was rising from the object being heated. However this only occurs in liquids and gases, because the intermolecular bonds in solids are too strong and the particles cannot freely move from one place to another

This was due to the principle of convection. When particles are heated, they gain more energy and become less dense than the other particles around it. This causes the less dense particles to rise above the denser particles. The "cold" air sinks to the bottom and pushes the warm air up, in what is known as a convection current. This is what we call rising heat. The heat is transferred through the rising particles.

Heat Transfer by Convection

- Convection is the process of heat transfer through the mass motion or flow of some fluid, such as air or water.
- When a pot of water is heated, convection currents are set up as the heated water at the bottom of the pot rises because of its reduced density and is replaced by cooler water from above.

