

HEAT AND HEAT TECHNOLOGY

Thermal Energy

All matter is made up of particles that vibrate with kinetic energy. This movement of particles occurs even when the temperature goes well below zero. When we use the term **temperature**, we are referring to the amount of thermal energy that a substance has.

Thermal energy is the sum of the energy of the moving particles and the potential energy of the resting particles.

Temperature is usually measured on the Celsius or Centigrade scale. On this scale, the freezing point of water is 0 degrees and its boiling point is 100 degrees.

Boiling Points of Various Liquids



The illustration shows a group of diverse children standing on a green patch of grass. Above them are four thought bubbles containing icons for science (microscope, beaker, globe), mathematics (atom, pie chart, bar graph, calculator), and language (ABC on a laptop). The children are looking up at the bubbles with thoughtful expressions.

PREVIEW

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Lesson Checkpoint:

What is the difference between temperature and heat?

Heat Transference

Heat is transferred in three different ways:

The first way is by **conduction**. When an object heats up without the movement of any particles in the object, conduction has occurred. A frying pan heating up on a stove is a good example of this (that is, the pan itself, not the food in it).



The next way is by **convection**. This occurs whenever there is a movement of particles in the object being heated. For example, heating water causes currents to develop and it is these currents that make the heat spread.

The third way is by **radiation**. This type of heat transfer does not involve matter. Instead, heat is transferred by electromagnetic waves such as artificial light and sunlight.

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One of the best uses of heat is to produce electricity. Fuels like coal and oil are burned and the heat released changes water to steam. This steam is used to turn the turbines in generators to produce the electricity.

Heat is also used in internal combustion engines like car engines. In these engines, gasoline is burned and the heat released gets transformed to mechanical energy.

In refrigerators and air conditioners, heat is transferred for the opposite effect of creating lower temperatures.

Lesson Checkpoint:
Name two ways heat is used in your area.