

Heat and Energy Terms

Kinetic Energy:

Kinetic energy is the energy of movement. All moving objects have kinetic energy. In Motion and Forces you found that kinetic energy can be measured: $E_k = \frac{1}{2} mv^2$.

Potential Energy

Potential energy is stored energy due to position.

Potential energy can be gravitational due to its position above a reference point and this can be calculated: $E_p = mgh$.

Chemical potential energy due to stored energy within the molecules of substances.

Nuclear potential energy held within atoms.

Thermal Energy (or Internal Energy)

The thermal energy of an object is the total of the potential and kinetic energies of all the particles within the objects (this is sometimes known as the internal energy of the object).

As the particles that make up the object are always moving (vibrating, rotating and/or translating) they have kinetic energy. They are also attracted or repelled by neighbouring particles so have a position in relation to other particles - this is their potential energy.

Heat

Heat is the **transfer** of thermal energy from a hotter object to a cooler object until thermal equilibrium has been reached. Some non-physics people (obviously not us) refer to this as a 'flow' of energy between objects.

Temperature

Temperature is a **measure** of the **average** kinetic energy of the particles in the object. We use a thermometer to give an exact measurement in degrees Celsius or in Kelvin. As you can see, the temperature doesn't depend on the potential energy but on the average kinetic energy.

Thermal Equilibrium

Thermal equilibrium is reached when two objects have the same temperature and heat transfer between the objects stops.

Remember

Heat - Transfer of energy from hotter to cooler object until thermal equilibrium is reached.

Temperature - measure of average kinetic energy of the particles of the object.

Thermal energy (internal energy) - sum of potential and kinetic energy of object.