

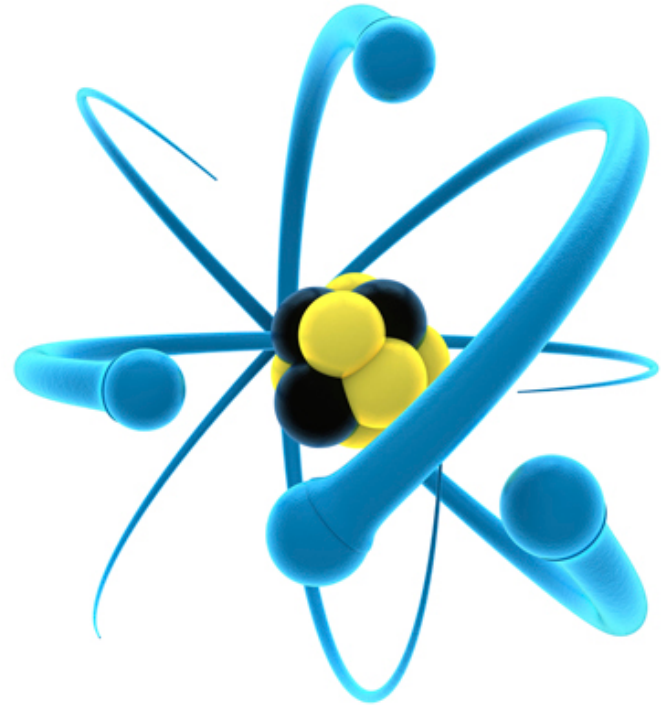
Thermal Energy and Heat

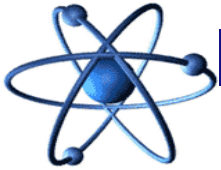
**Kinetic Energy,
Thermal Energy,
Temperature and Heat**



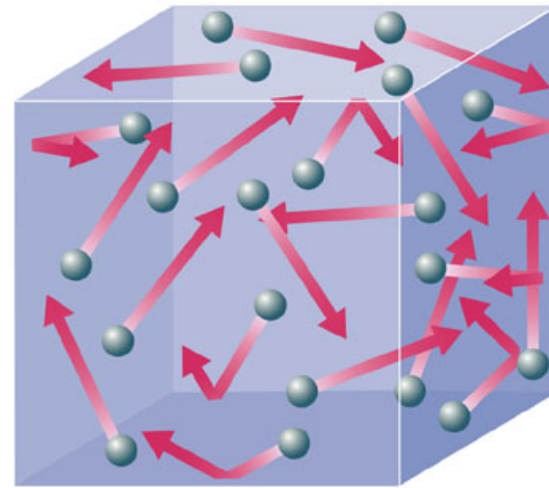
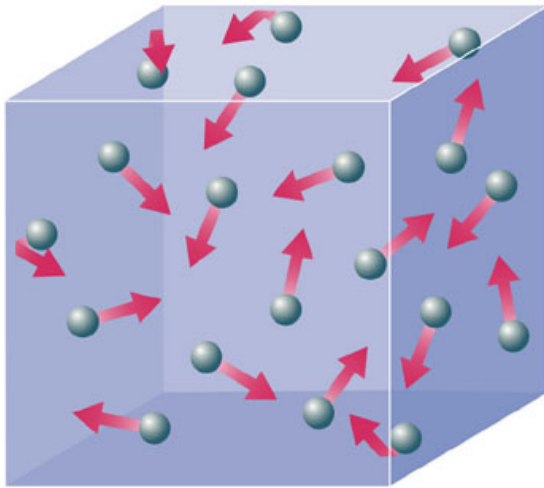


**Kinetic Energy is
the energy of a
moving particle.**





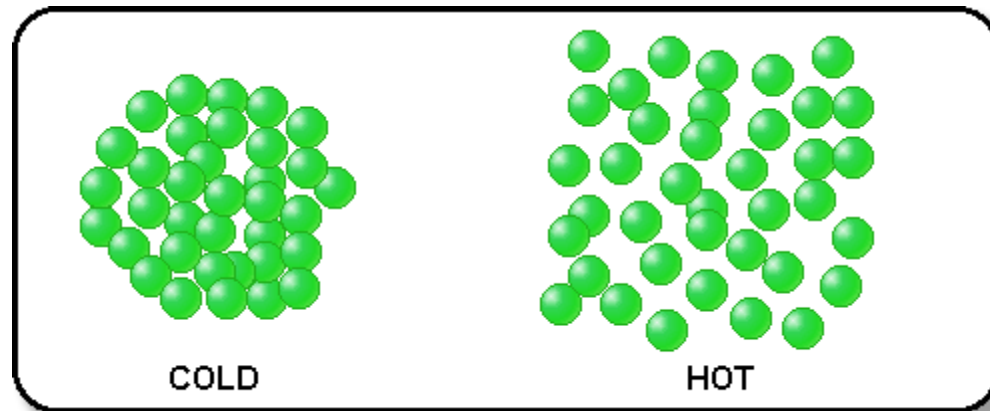
The more kinetic energy something has the more the particles move around, the more it expands and the warmer it feels.

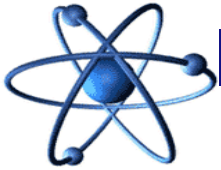


Longer arrows mean higher average speed.



The less kinetic energy something has the less the particles move around, it contracts and the cooler it feels.



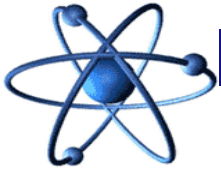


Grab the metal leg of your chair...

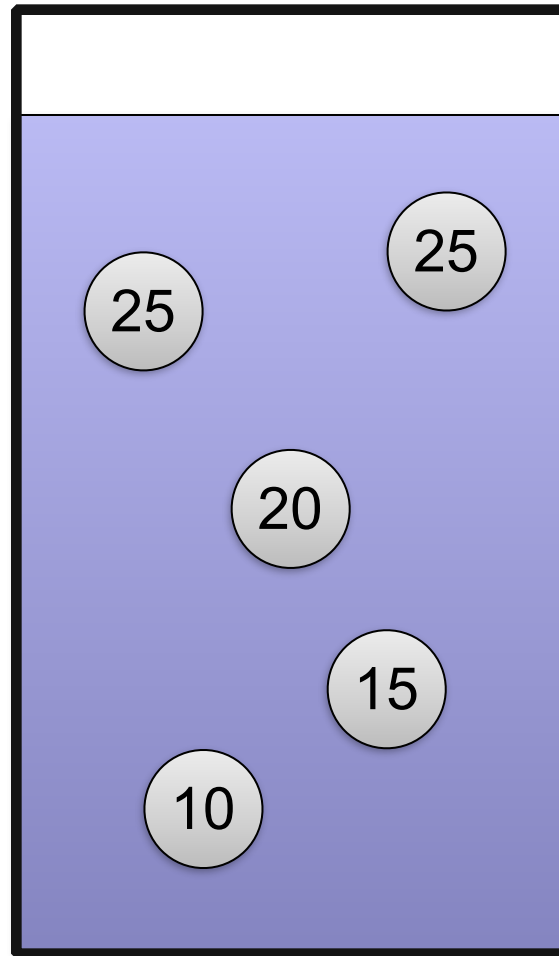
What does it feel like? Why?

Touch your face with the same hand...

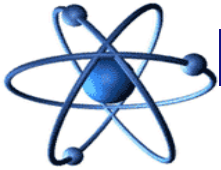
What does it feel like?



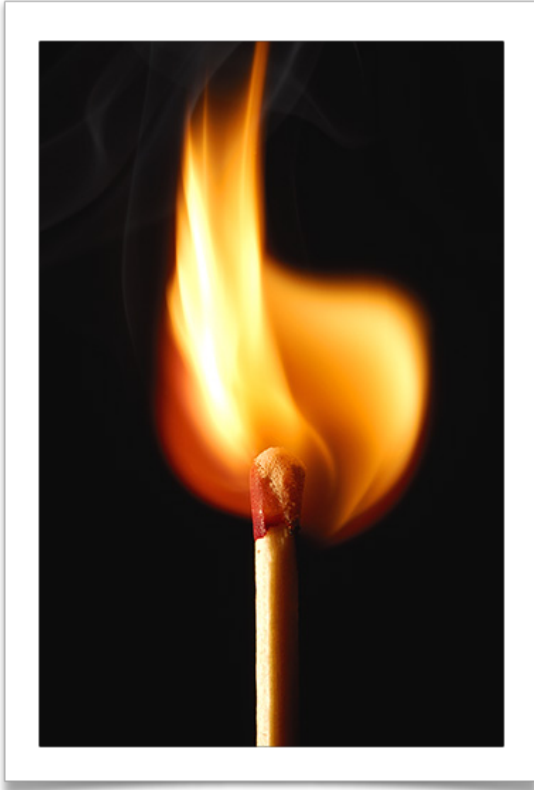
Thermal Energy
is the total or sum
of all the kinetic
energy of the
particles in a
substance.

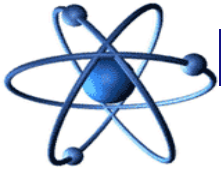


$$\begin{array}{r} 25 \\ 25 \\ 20 \\ 15 \\ \hline +10 \\ \hline 95 \end{array}$$

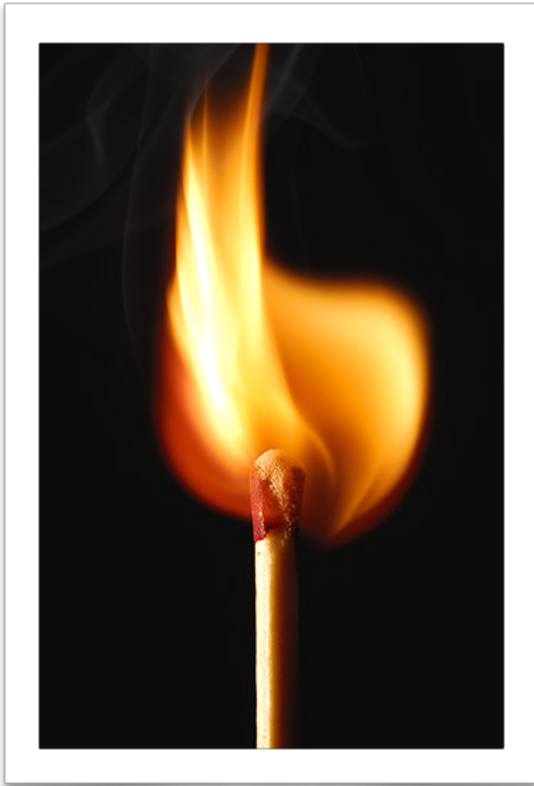


Which has more thermal energy??

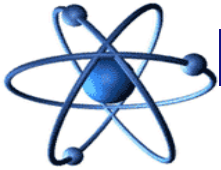




Which has more thermal energy??



The ice sculpture has more energy – believe it or not



Which has more thermal energy??





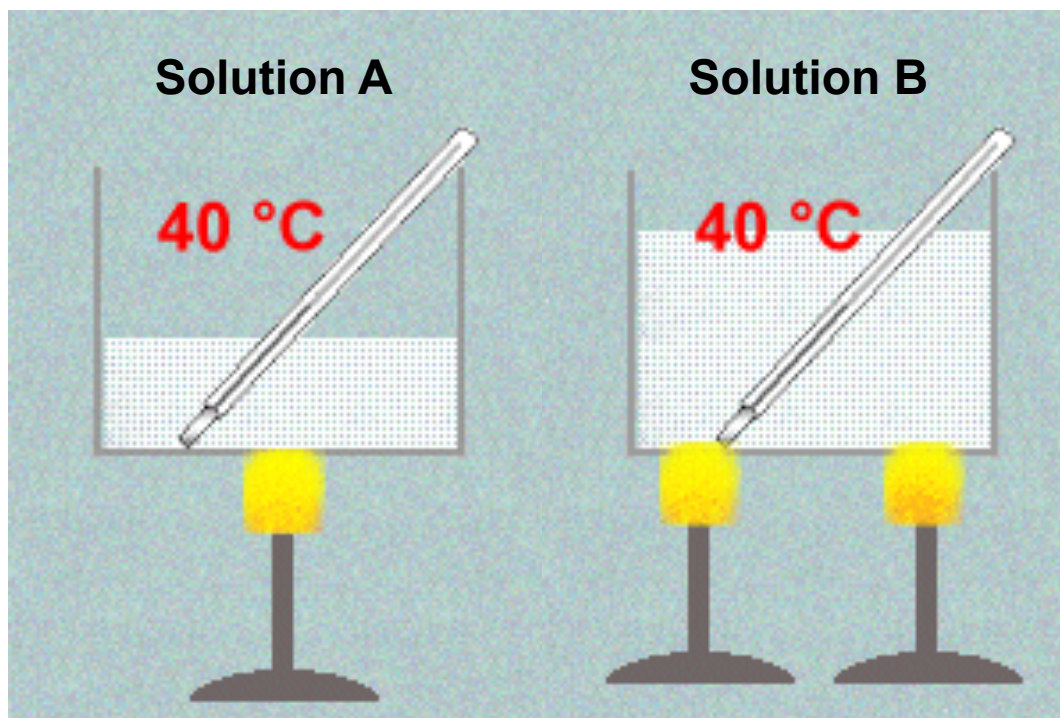
Which has more thermal energy??



A lake filled with freezing cold water has more Thermal energy than a cup of boiling water because it has trillions times more particles.

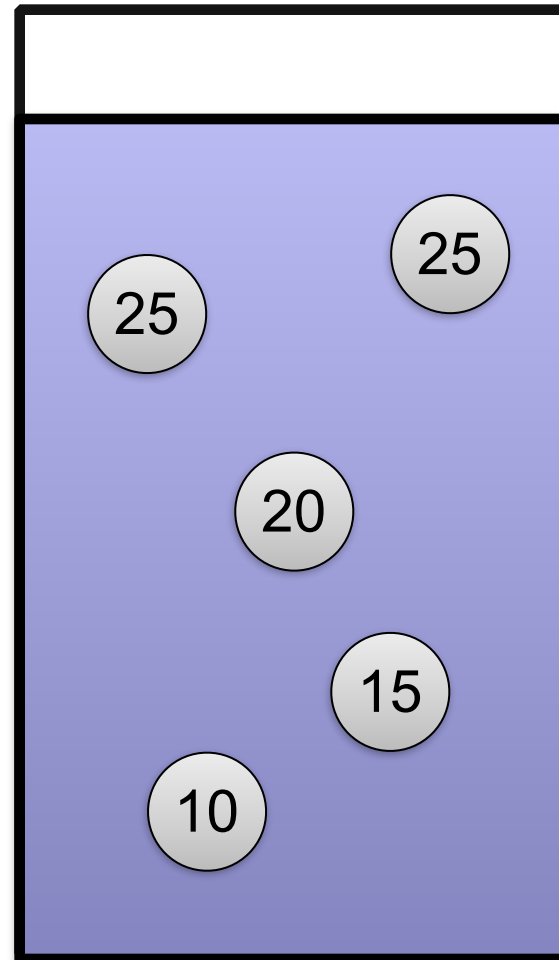


In the examples below, it takes twice as much energy to raise the temperature to 40 degrees in solution B because there are twice as many particles to be heated.





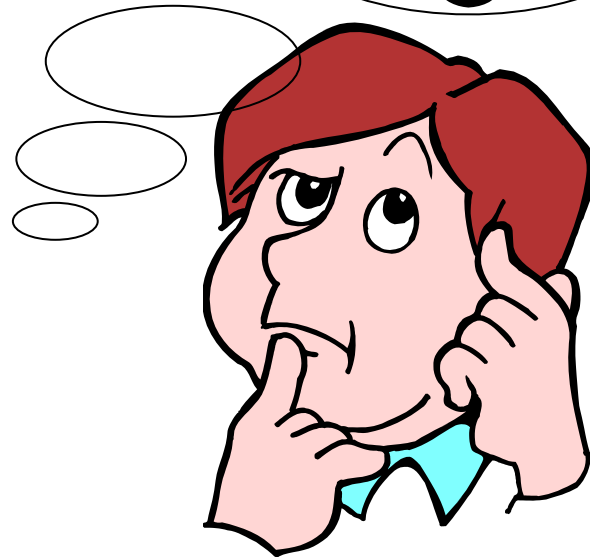
**Temperature is
the average of all
the kinetic energy
of the particles in
a substance.**

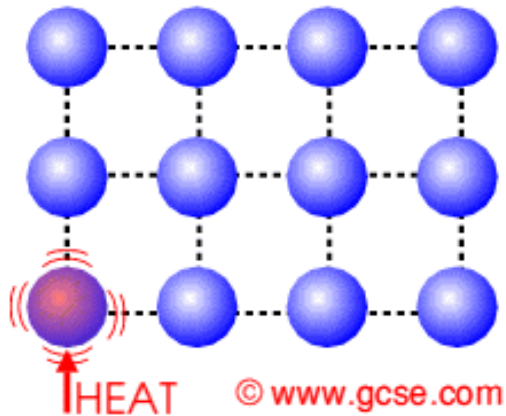
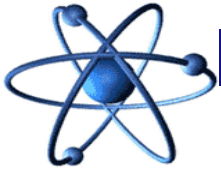


$$\begin{array}{r} 25 \\ 25 \\ 20 \\ 15 \\ +10 \\ \hline 95 \end{array}$$

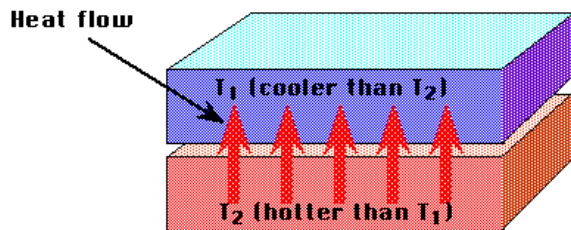
$$95 / 5 = 17$$

What is heat?

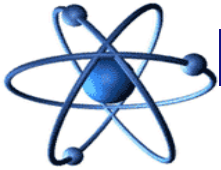




Heat is the transfer of thermal energy from one object to another because of a temperature difference



Heat always travels from high energy to low energy.



Assessment:

Is any “heat” (thermal energy) transferred between two objects at the exact same temperature?

Why would you freeze to death if you went swimming for 10 hours in 25 degree water in the middle of summer?