

Temperature: A measurement of heat

Heat: A type of energy created by the motion of atoms and molecules. It is the energy transferred between two things due to temperature differences

Internal Energy: The total amount of energy in a substance due to the motion of the molecules or the potential energy of the substance. A substance doesn't contain heat it has internal energy.

Conduction: Transfer of heat through a solid by the vibration of molecules

Convection: Transfer of heat through a fluid by density differences

Radiation: Transfer of heat through a vacuum by waves

At absolute zero the heat for the object, the molecular motion and the internal energy are all low to zero

At room temperature there would be molecular motion so there would be internal energy and the transfer of heat

Part A

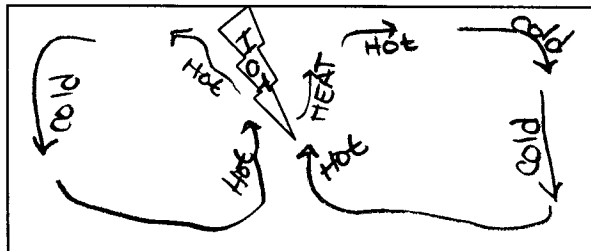
The best absorber would be the black and the worst would be the white paper.

Wearing white on a hot day reflects the heat so you don't get too hot. Just as a Lemur would want to have dark fur in the morning to absorb as much of the sun's energy as possible.

Part B

The hottest is the metal spoon and the coolest is the wooden spoon. The best conductor therefore is the metal spoon and the worst would be the wooden one. This shows that metal absorbs and transmits heat much easier than wood. Therefore if I wanted to winterize my home (keep the heat in and the cold out) I would choose wood. This absorbs little of the interior heat and doesn't conduct it to the outside.

Part C




Convection works on density differences. The hot fluid (be it air or water) has a lower density so it rises. The cold fluid has a higher density so it sinks. As the cold air at the bottom is warmed it rises and the warm air at the top loses its heat so it begins to sink creating convection cells

Part D

The images in the scopes appear opposite than how they look because most scopes are made with mirrors which reverse the image you see.

You should have noticed for this experiment that the steel (iron) rod expanded more. This means that the iron has the higher thermal coefficient of expansion.

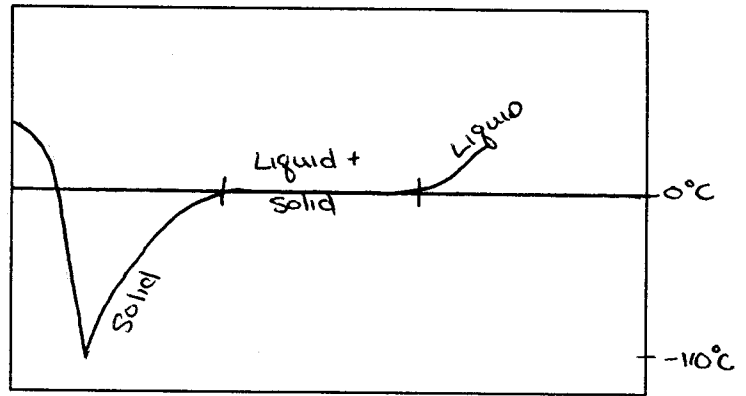
The tracks buckled because the builders put the rails too close together: 

To build the model you would want to use aluminum rails to prevent any expansion and contraction problems

Part E

Water and phase changes.

The diagram shows the results of the experiment we did in lab. We froze water to about -100°C and then let it warm up. We measured the temperature of the water as the temperature changed. Some things to note. The water stayed at 0°C for about 20 minutes. While it was at this temperature, if you had gone to look in test tube you would have seen both phases (ice and liquid) in the tube. The temperature moved off of 0°C when the ice had all melted. The reason for this is that the energy being taken into the test tube was going to the phase change and not into a temperature change. Therefore the internal energy was increasing for the solution in the tube but the temperature was not.



Post Lab

When heat or energy is transferred through space (a vacuum) it is transferred as radiation. To transfer heat by conduction requires a fluid and there is no fluid in space and to transfer by convection it requires a solid and space is a vacuum not a solid.

Transferring heat through the earth is done by conduction (solid regions: inner core, mesosphere and crust) and convection (fluid or plastic regions: outer core and asthenosphere)

Heat will transfer by conduction through a door

Temperature of water will increase until the water starts to boil. Then the internal energy will rise but the temperature will stay the same until all the water is converted from the liquid phase to the vapor phase. At this time the temperature will start to rise again.

Hot water takes longer to freeze than cold water. When the temperature difference between two objects is large the transfer of heat is rapid. This is the reason this myth became popular. If we think about hot water cooling down when it first starts to cool it cools very quickly. However, as it gets closer to freezing the heat transfer slows down. By starting with cold water we eliminate this first step of cooling down and go right to the slow part of the process. Both cold and hot water have to go through the slow cooling stage. See below

