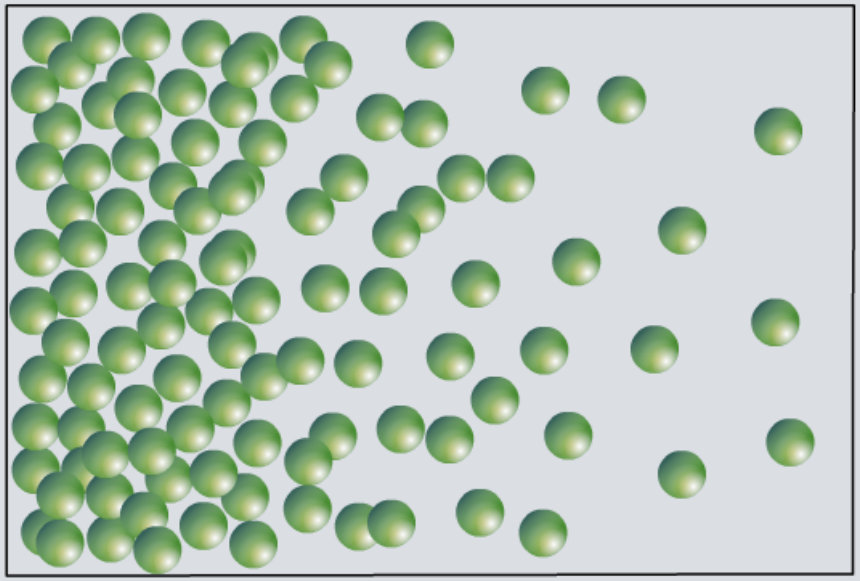
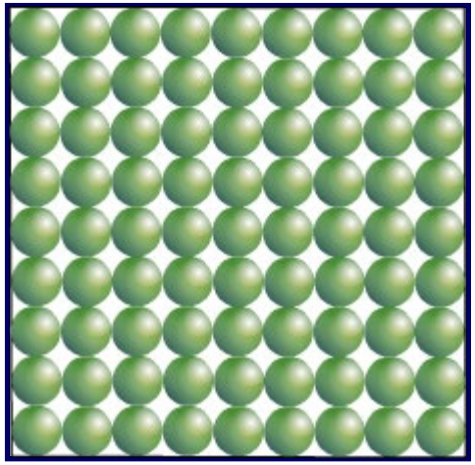
Conduction and Convection

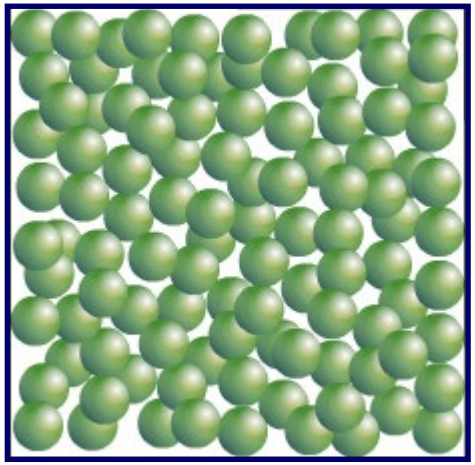


What is conduction?

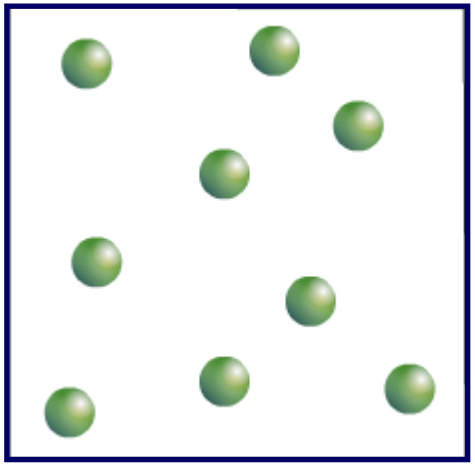
How are the particles arranged in a solid, a liquid and a gas?



solid



liquid



gas

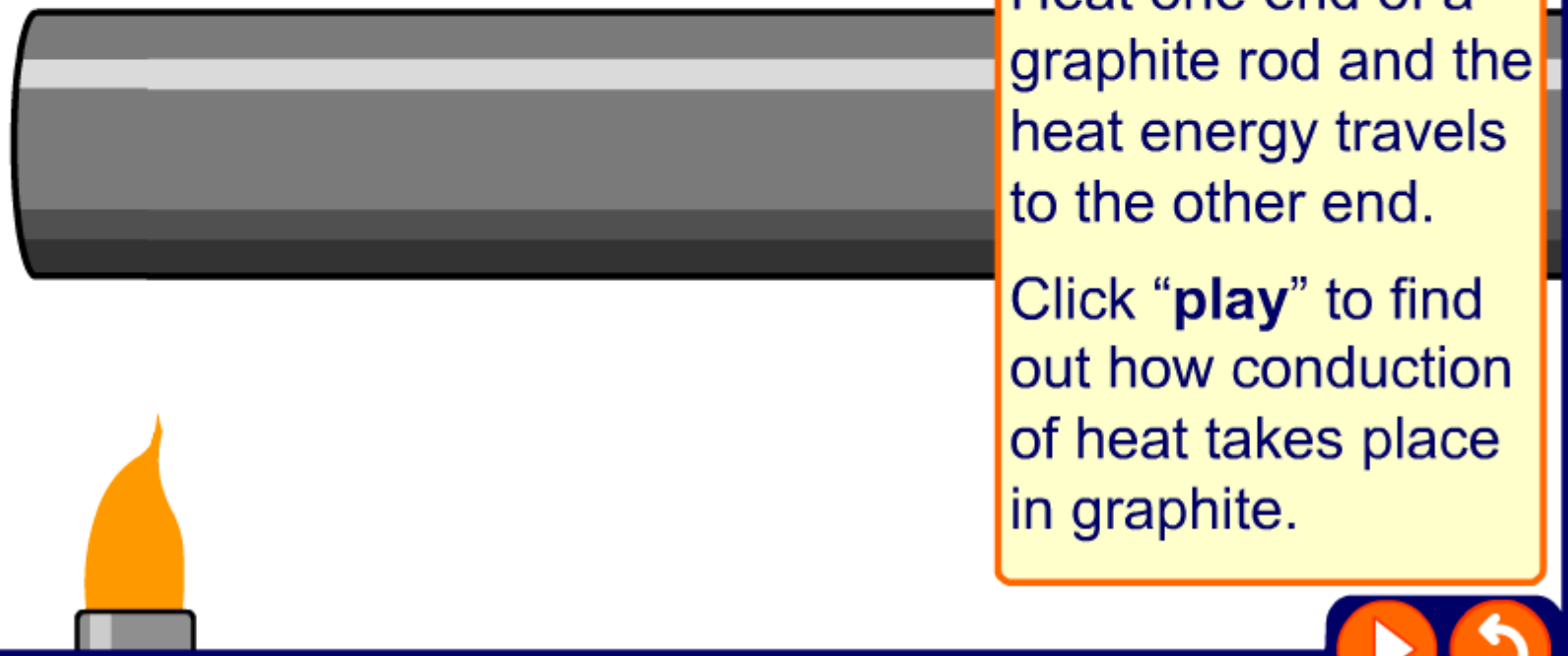
Particles that are very close together can transfer heat energy as they vibrate. This type of heat transfer is called **conduction**.

Conduction is the method of heat transfer in **solids** but not liquids and gases. Why?

What type of solids are the best conductors?

How do nonmetals conduct heat?

How does conduction take place in a nonmetal?



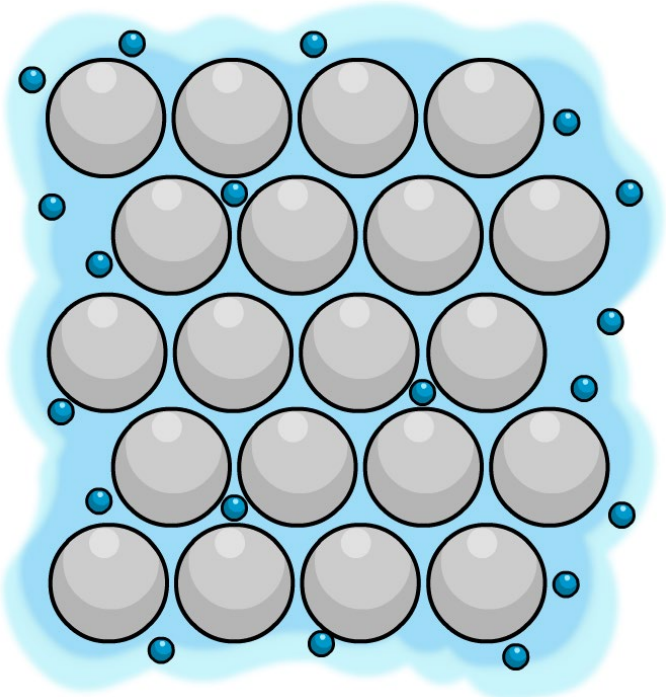
Graphite is a good nonmetal conductor of heat.

Heat one end of a graphite rod and the heat energy travels to the other end.

Click "**play**" to find out how conduction of heat takes place in graphite.

How do metals conduct heat?

Metals are good conductors of heat. The outer electrons of metal atoms are not attached to any particular atom. They are free to move between the atoms.



heat

When a metal is heated, the free electrons gain kinetic energy.

This means that the free electrons move faster and transfer the energy through the metal.

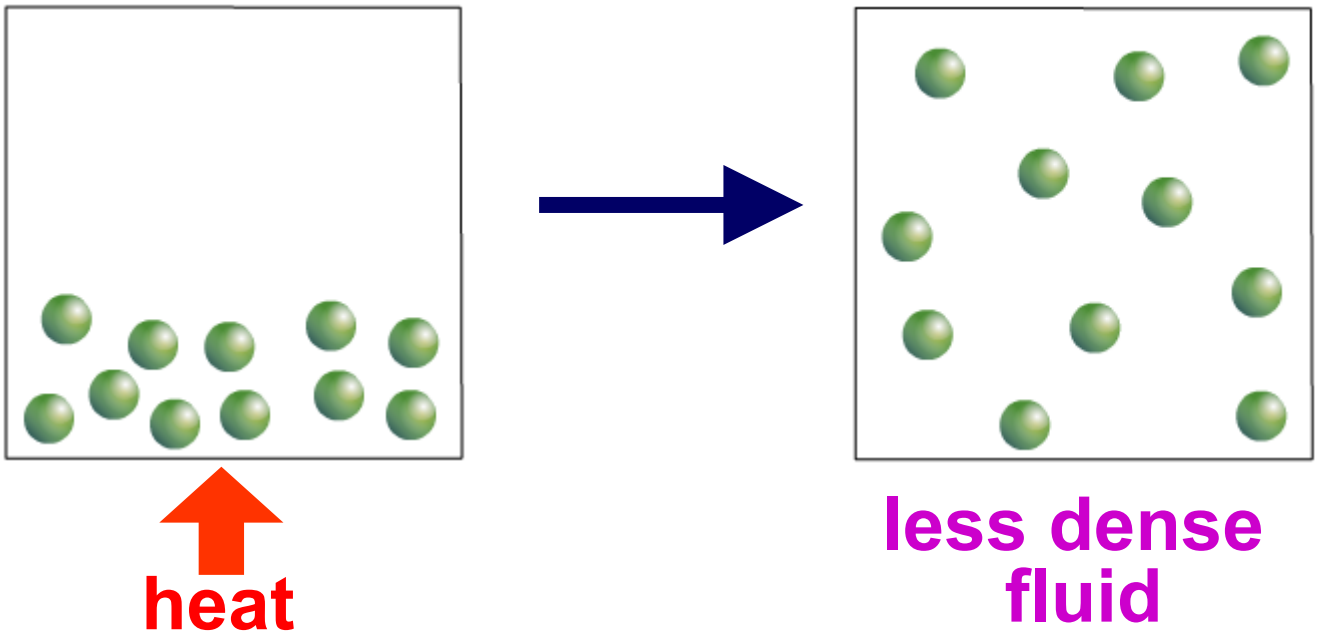
This makes heat transfer in metals very efficient.

Insulators do not have free electrons and so they do not conduct heat as well as metals.

What happens a fluid is heated?

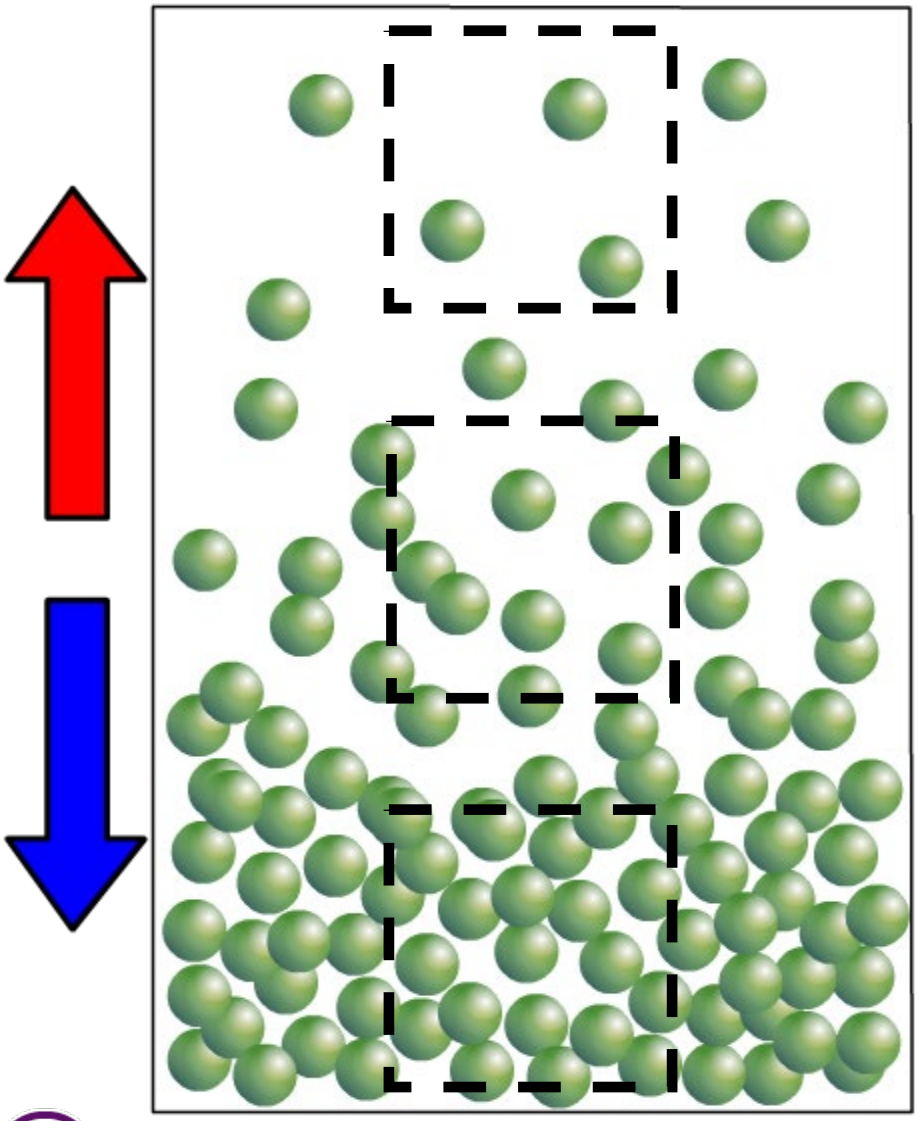
Liquids and gases can both flow and behave in similar ways, so they are called **fluids**.

What happens to the particles in a fluid when it is heated?



The heated fluid particles gain energy, so they move around more and spread out. The same number of particles now take up more space, so the fluid has become **less dense**.

What is convection?



Warmer regions of a fluid are **less dense** than cooler regions of the same fluid.

The **warmer** regions will **rise** because they are less dense.

The **cooler** regions will **sink** because they are more dense.

This is how heat transfer takes place in fluids and is called **convection**.

The steady flow between the warm and cool sections of a fluid, such as air or water, is called a **convection current**.

How does convection in a liquid occur?

How does convection heat water in an electric kettle?

The heat source in an electric kettle is a heating element at the bottom of the kettle.

Click "**play**", or the "**on**" button, to find out how convection makes it possible for this heating element to heat all the water in the kettle.

How does convection in a gas occur?

Why is convection important in fridges?

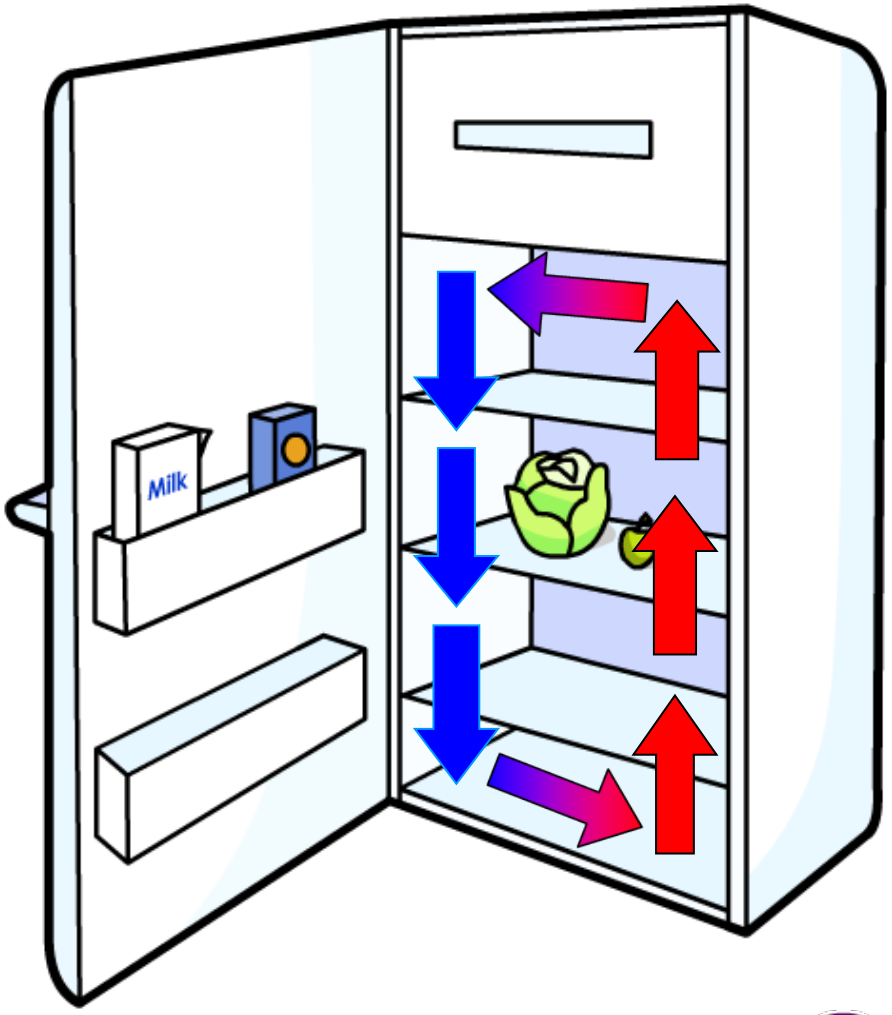
Why is the freezer compartment at the top of a fridge?

The freezer compartment is at the top of a fridge because cool air sinks.

The freezer cools the air at the top and this cold air cools the food on the way down.

It is warmer at the bottom of the fridge.

This warmer air rises and so a **convection current** is set up inside the fridge, which helps to keep the fridge cool.



Conduction and convection – summary

What are the missing words about conduction and convection?

1. Heat always moves from [?] areas to [?] areas.

2a. Conduction in nonmetals occurs because vibrating atoms hit neighboring atoms and cause them to [?] faster.

2b. Metals are better [?] than nonmetals because they have [?] electrons that are able to move and transfer the heat.

3a. When a fluid is heated it [?]

? C solve