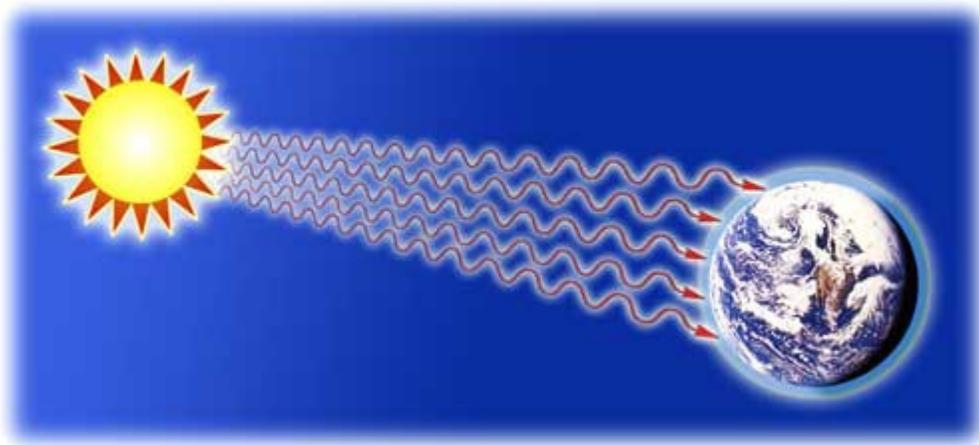


## Explanation of the differences between radiation, convection, conduction.

Explaining **radiation**.

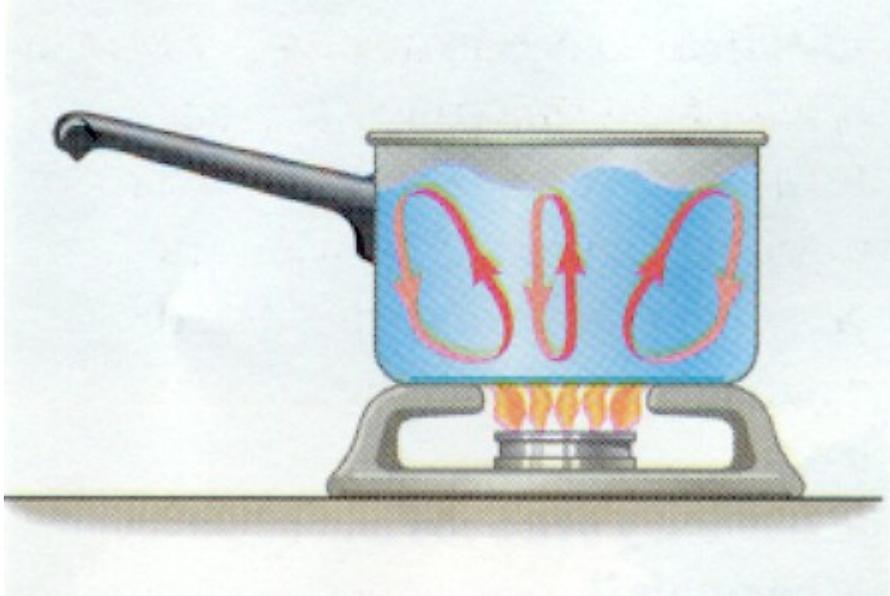
Every body which has a temperature above **0 Kelvin** gives out (i.e. radiates) some heat in the form of waves. (Even humans radiate!) Of course, the amount of this radiation depends on the temperature, so the more the temperature of the body, the more heat it gives out. Now, since this heat energy travels in the form of waves, it **does not necessarily require any medium** to travel. So, **it can travel in any medium or in no medium**.



Explaining convection by example.

Consider a beaker of water being heated from the bottom. The water in the lower region gets heated up, becomes lighter in weight, and hence comes to the top. Now the (relatively) cooler region of water on the top comes down and begins to heat up. Now, again it gets heated up, and moves up when it becomes lighter than the (previously heated) water on the top, but this time getting more heated than the water on the top. This process continues, and eventually every molecule of water gets heated up.

As you can see, in this process, the motion of the particles lead to the heating of the whole body (water, in this case) - **the warmer ones moved away from the source of heat to let the cooler ones collect the heat**.



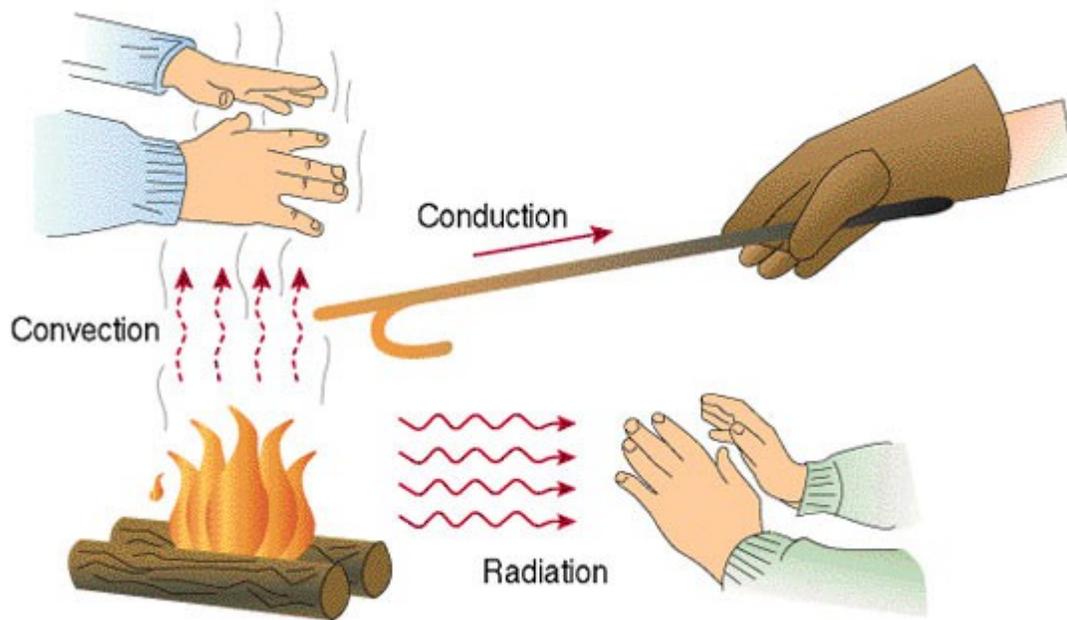
So, it's clear that **convection requires a medium** (specifically, a non-solid medium). Unlike radiation, if there is no medium near the source, it cannot lose its heat simply using convection. (It can of course lose it via radiation.)

Heating of an **iron rod**.



*Convection* is one of the modes of heat transfer here. But, so is *radiation*. Remember, that the iron rod is too hot as compared to the surrounding temperature and so it will radiate a lot of heat. In fact, the heat is so much that the rod glows bright red. (If you know a little about the EM spectrum, you would know that when the emission from a body also includes the visible spectrum, we can actually see (a part of) the emission spectrum.)

In reality, all 3 modes of heat transfer occur simultaneously.



Even in the above beaker example, the water molecules, (along with convection) give out heat in the form of radiation as well, because they have a non-zero temperature. They also transfer heat by collisions to other water molecules, which is known as conduction. However, in that example, convection was the most dominant mode of heat transfer.

If you wish to know the exact difference between these modes of transfer, you would perhaps benefit from enrolling in an intermediate-level engineering course.