

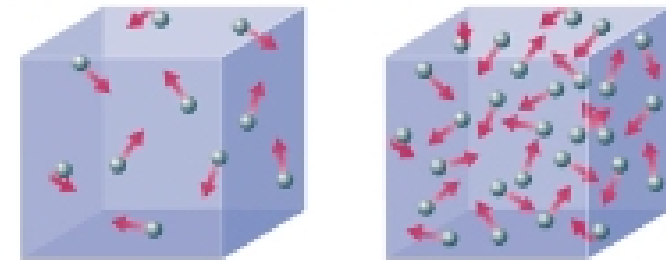
Questions of the Day

- How would you describe the difference between temperature and energy?
- What are ways that energy can transform from one form to another?
- What is light?
- How do energy and wavelength vary along the electromagnetic spectrum?
- What are the properties of a thermal spectrum?
- How does the color of an object change with temperature?

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Energy is not the same as Temperature!

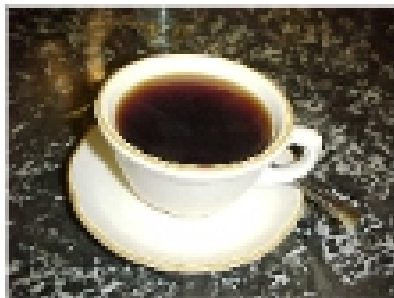
- Temperature: indicates typical speed of particles.
- Energy: related to both speed & mass.



Same Temperature, Different Total Energy

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Same temperature, Different energy



Water molecules are moving with the same speeds in both, but there's less energy in the cup. V is the same, but M is different.

[Energy per particle is the same, but more particles in the urn]

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Deep fact:

Energy is always conserved

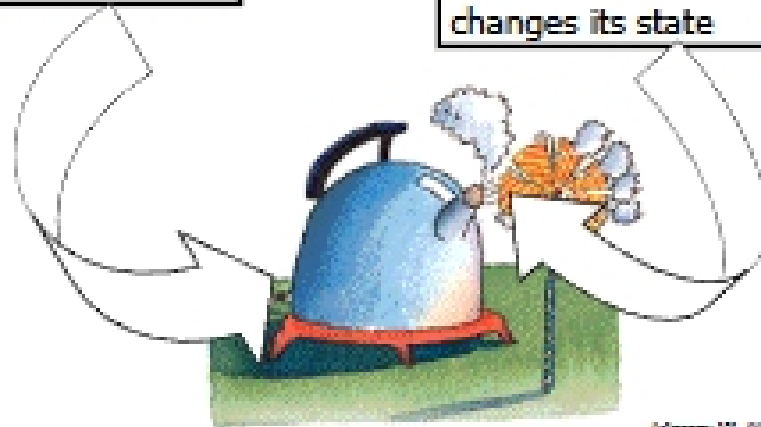
It can change from one form to another, or be transported from place to place, but it never disappears.

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Changes in temperature are usually associated with the transfer of energy

Heat (i.e. energy) transfers to water through conduction.

Increased energy increases the water's temperature, and changes its state



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How does energy move from place to place?

1. **CONDUCTION:**



Matter stays in about the same place, Energy moves!

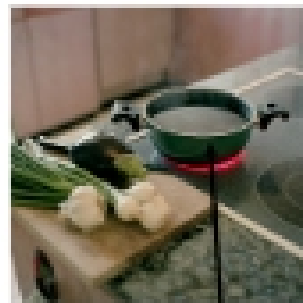
Energetic particle whaps another energetic particle, which whaps another energetic particle, which whaps another one...

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Examples of conduction:



Cold here initially, but gradually warms up.



Metal in pot conducts heat from stove to water.

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How does energy move from place to place?

2. **CONVECTION:**



Energy physically moves from one place to another
→ Both Energy and Mass transport spatially

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Examples of convection:



Lava heats up in bottom of the lamp, and rises.

How does energy move from place to place?

3. RADIATION:

Energy is transported by light.



Radiation:

- Emission of Light = "Radiation"

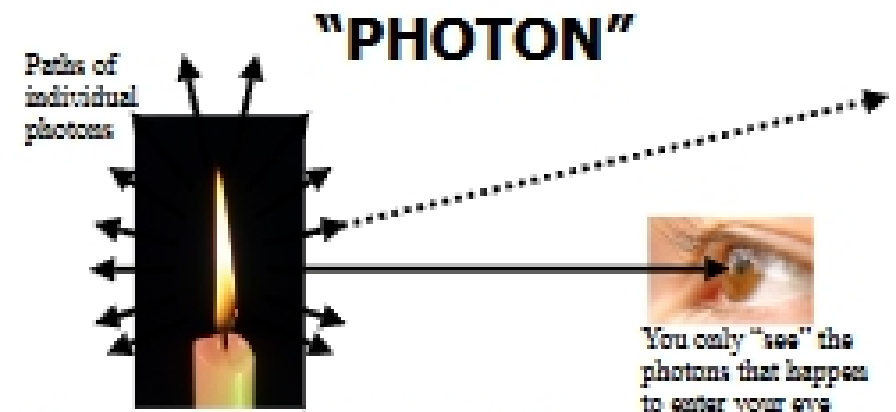


"Bad" radiation is light which has so much energy that it can damage what it runs into.

We use a more general definition of radiation
→ any light emitted from an object.

The Facts of Light

- Light sometimes acts like a massless particle



Goes in a straight line unless it interacts with something else (i.e. is reflected, absorbed, or scattered).